

Endemic families of Madagascar. III. A synoptic revision of *Schizolaena* (Sarcolaenaceae)

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ABSTRACT

As part of an assessment of the conservation status of the vascular plant families endemic to Madagascar and the Comoro Islands, a synoptic revision is presented of *Schizolaena* (Sarcolaenaceae). Recent molecular sequence data indicate that Sarcolaenaceae are sister to Dipterocarpaceae in an expanded Malvales. Within the family, *Schizolaena* appears closest to *Rhodolaena*: both have a greatly expanded involucre in fruit enclosing (1-)2 sessile flowers with numerous stamens, but *Schizolaena* has only 3 sepals and branched inflorescences versus 5 sepals and a single pair of flowers borne on a long peduncle in *Rhodolaena*. Study of available herbarium material allows the recognition of 18 species, eight of which are described as new (*S. capuronii*, *S. cavacoana*, *S. gereauti*, *S. manomboensis*, *S. masoalensis*, *S. milleri*, *S. tampoketsana*, and *S. turkii*). A key to the species is provided in English and French.

KEY WORDS

Sarcolaenaceae,
Schizolaena,
Madagascar,
endemism.

Familles endémiques de Madagascar. III. Révision synoptique du genre Schizolaena (Sarcolaenaceae).

Dans le cadre de l'évaluation, pour la conservation, des familles de plantes vasculaires endémiques de Madagascar et des Comores, la révision synoptique du genre *Schizolaena* (Sarcolaenaceae) est présentée. Des données moléculaires récentes indiquent que les Sarcolaenaceae sont proches des Dipterocarpaceae au sein des Malvales au sens large. Chez les Sarcolaenaceae, le genre *Schizolaena* semble proche de *Rhodolaena* ; ils ont en commun un involucre fructifère très développé qui entoure (1-)2 fleurs sessiles à étamines nombreuses, mais *Schizolaena* n'a que trois sépales et possède des inflorescences ramifiées tandis que chez *Rhodolaena* il y a cinq sépales et une seule paire de fleurs portées par un long pédoncule. L'étude de l'ensemble du matériel disponible nous permet de reconnaître 18 espèces, dont huit nouvelles sont décrites ici (*S. capuronii*, *S. cavacoana*, *S. gereaii*, *S. manomboensis*, *S. masoalensis*, *S. milleri*, *S. tampoketsana*, and *S. turkii*). Une clé de détermination est fournie en anglais et en français.

MOTS CLÉS
Sarcolaenaceae,
Schizolaena,
Madagascar,
endémisme.

INTRODUCTION

This is the third in our series of taxonomic revisions of genera belonging to Madagascar's eight endemic plant families, which we are preparing as a basis for publishing a Red Data Book to assess the conservation status of each of the approximately 95 species concerned (SCHARTZ et al. 1998, 1999a,b). For the present paper, we have examined the available material of *Schizolaena* Thouars (Sarcolaenaceae) at the major herbaria with important holdings of Malagasy plants (K, MO, P, TAN and TEF), and we have reviewed and revised the circumscription of species as presented by CAVACO (1952a,b) and updated by CAPURON (1963).

CAVACO (1952b; see also CAVACO 1952a) treated *Schizolaena* in his revision of Chlaenaceae (= Sarcolaenaceae) for the Flore de Madagascar et des Comores, recognizing eight species. A decade later CAPURON (1963) described two additional species and placed one previously recognized species in synonymy, bringing the total number to nine according to his circumscription. One year before his death, CAPURON (1970) published detailed observations on each of the ten genera of Sarcolaenaceae he recognized, including *Schizolaena*, based largely on the extensive personal experience he had gained in over 20 years of field work in Madagascar. Although that paper

contained no new species or taxonomic changes, it nevertheless provided a valuable review of important characters within the family, and proposed informal infrafamilial groups within Sarcolaenaceae using a combination of morphological and palynological features.

Based on a talk presented at the 8th AETFAT Congress held in Geneva in September 1974, LEROY (1975) published a short paper in which he reviewed CAPURON's concepts of species delimitations within *Schizolaena* in an attempt to discern patterns of speciation with regard to factors such as geography and ecology, and to delimit natural (i.e., putatively monophyletic) groups of species. LEROY recognized three such groups, each comprising two or more species as circumscribed by CAPURON, many of which were further subdivided into phenons, defined as collections of phenotypically more or less similar individuals. LEROY (1975) did not publish any novelties, but he clearly intended to do so at a later date. In all, he indicated that 12 species should be recognized within *Schizolaena*, along with perhaps five additional taxa that could be treated either as species or subspecies. Unfortunately, although extensive notes were made on the collections in the Paris herbarium, LEROY's interpretations remained unpublished at the time of his death earlier this year.

A careful re-examination of the available mate-

rial of *Schizolaena* clearly indicates that LEROY had developed a thorough understanding of character variation within the genus. Several rather broadly circumscribed species recognized by previous authors were shown to comprise heterogeneous assemblages that could be divided into morphologically and geographically coherent entities – i.e., into phenons. Moreover, LEROY's phenons correspond remarkably well to the species concept developed by the first and second author of the present paper, in which special emphasis is placed on ecogeographic parameters by evaluating taxa with regard to their distribution within Madagascar's biogeographic zones (CORNET 1974; see also LOWRY et al. 1997) and the substrates on which they occur (DU PUY & MOAT 1996).

Based on molecular sequence data, Sarcolaenaceae and Dipterocarpaceae are now recognized as sister taxa within an expanded Malvales (ALVERSON et al. 1998; BAYER et al. 1999). Miocene fossil pollen clearly belonging to Sarcolaenaceae has been recorded from South Africa (COETZEE & MULLER 1984), indicating that the family was once more widespread, but is now endemic to Madagascar as a result of extinction in Africa and perhaps elsewhere.

Within Sarcolaenaceae, *Schizolaena* appears to be most closely related to *Rhodolaena*, with which it shares the presence of an involucre that is reduced to a small collar in flower but expands greatly and becomes fleshy in fruit, and which subtends and later encloses a pair of flowers, one or both forming a woody, septicidally dehiscent capsule (the flowers are borne singly in a few species, such as *S. exinvolucrata*, *S. gereaui* and *S.*

tampoketsana). Both genera also have numerous stamens: 15 to well over 100 in *Schizolaena*, and ca. 15-50 in *Rhodolaena*. *Schizolaena* is distinguished by having only three sepals, versus five in *Rhodolaena*, the outer two of which are highly reduced. Also, species of *Schizolaena* have branched inflorescences with 4 to 100 or more flowers, depending on the species, whereas in *Rhodolaena* only a single pair of flowers is usually borne at the end of a long peduncle.

Based on a re-assessment and update of the third author's earlier work, we propose the following revised taxonomy, in which 18 species are recognized, eight of which are newly described. The epithet chosen for one of the new species (*Schizolaena capuronii*) was taken from annotations made by LEROY in the Paris herbarium. For the "Material examined" cited below under each species, abbreviations are as follows: PN = Parc National; RNI = Réserve Naturelle Intégrale; RS = Réserve Spéciale; STF = Station Forestière. A full listing of exsiccatae for each species, with complete localities and latitude/longitude coordinates, is available on the World Wide Web through W3 TROPICOS (<http://mobot.mobot.org/Pick/Search/pick.html>). Geographic coordinates indicated in square brackets were assigned *post facto* using available information on Malagasy place names and topographic maps.

SCHIZOLAENA Thouars

Hist. Vég. Isles Austr. Afriq.: 43 (1805).

TYPE.—*Schizolaena rosea* Thouars.

Key to the species of *Schizolaena*

1. Largest leaves with blades less than 3(-3.5) cm long 2
- 1'. Largest leaves with blades greater than (5-)6 cm long 3
2. Leaf blades elliptic or broadly ovate to suborbicular, 1.5-2 times as long as wide; petals stellate pubescent on abaxial surface; granite and marble outcrops, Ibity to Isalo 11. *S. microphylla*
- 2'. Leaf blades narrowly elliptic to obovate, mostly greater than 2 times as long as wide; petals glabrous on abaxial surface; humid forest, Rantabe watershed, Baie d'Antongil 1. *S. capuronii*
3. Petals densely covered with straight, appressed indumentum on abaxial surface; stipules and inflorescence bracts ovate, persistent (bracts caducous in *S. milleri*); involucre in fruit broadly to narrowly funnelform, usually divided less than 1/2 of the way to the base (to 2/3 of the way in *S. milleri* and *S. rosea*) 4
- 3'. Petals glabrous on abaxial surface; stipules and inflorescence bracts caducous, or inflorescence bracts persistent, opposite and suborbicular; involucre in fruit divided at least 1/2 of the way to the base 8

- 4. Petioles and young branches pubescent (occasionally glabrous in older material of *S. cavacoana*, but then mature involucre ca. 60 mm high) 5
- 4'. Petioles and young branches glabrous (rarely with scattered stellate indumentum) 6
- 5. Filaments densely pubescent; indumentum on leaves and branches short-tomentose, unbranched; stipules 5-9 mm long; petals 5-8 mm long; mature involucre 15-25(-50) mm high; dry forest, Ambilobe area and Vohemar 18. ***S. viscosa***
- 5'. Filaments glabrous; indumentum on leaves and branches stellate, forming distinct circular tufts; stipules (10-)12-15 mm long; petals ca. 15 mm long; mature involucre 60 mm high; humid forest, Rantabe watershed, Baie d'Antongil 3. ***S. cavacoana***
- 6. Leaves strongly coriaceous, ovate (rarely elliptic), broadest below the middle, apex acuminate, largest blade 11-14.5 cm long; littoral forest on sand, Ambila-Lemaitso STF, Tampina 8. ***S. laurina***
- 6'. Leaves chartaceous to coriaceous, elliptic to slightly obovate, broadest near the middle, apex acute to obtuse or rounded, largest blade rarely exceeding 9(-11) cm long 7
- 7. Leaves elliptic to ovate, usually at least 2 times as long as wide; petals 8-10 mm long; sepals 5-10 mm long at anthesis; margin of the involucre narrowly lacinate in fruit, the teeth 3-9 mm long; littoral forest on sand, Mahatsara STF and N of Ft. Dauphin 12. ***S. milleri***
- 7'. Leaves elliptic to obovate, usually less than 2 times as long as wide; petals 4-5 mm long; sepals 5-6 mm long at anthesis; margin of the involucre ± regularly dentate in fruit, the teeth 2-5 mm long; littoral forest on sand, Tampolo STF 15. ***S. rosea***
- 8. Leaves hispid-stellate pubescent on both surfaces, especially along the midrib and veins, blade narrowly elliptic-ovate, (3.5-)4.5-6.5 × 1.5-3 cm, greater than 2 times as long as wide, apex acuminate, base truncate to cordate; petals pink; area around village of Ranomafana E of Fianarantsoa 17. ***S. turkii***
- 8'. Leaves glabrous or with sparse indumentum but never stellate-hispid pubescent, leaves various 9
- 9. Key emphasizing flowering material (flowers unknown in *S. pectinata*) 10
- 9'. Key emphasizing fruiting material (fruit unknown in *S. tampoketsana* and *S. masoalensis*) 18
- 10. Leaves coriaceous, margins distinctly revolute 11
- 10'. Leaves chartaceous, margins flat to weakly revolute 14
- 11. Leaf apex acuminate, largest blade (10-)13 cm long; Manombo RS 9. ***S. manomboensis***
- 11'. Leaf apex rounded or emarginate to acute, largest blade not exceeding 10.5 cm long 12
- 12. Calyx with tufted, papillose stellate indumentum; peduncles (ultimate inflorescence segment below involucre) 4-12 mm long; littoral forest on sand, Masoala PN to Ft. Dauphin 4. ***S. elongata***
- 12'. Calyx evenly sericeous-stellate pubescent, the appressed trichome branches whitish, 0.4-0.6 mm long, oriented toward the apex; peduncles 1-3(-5) mm long 13
- 13. Largest leaves 8.5-10.5 cm long, apex rounded to emarginate (rarely acute), secondary and tertiary venation raised on upper surface; petals 4 mm long; involucre in fruit with long, thick processes; humid forest, Anjanaharibe-Sud RS and Masoala PN to Ft. Carnot 7. ***S. hystrix***
- 13'. Largest leaves not exceeding 6.5 cm long, apex acute (rounded in a few leaves), secondary and tertiary venation sunken on upper surface; petals 5-6 mm long; fruit unknown; Tampoketsa d'Ankazobe 16. ***S. tampoketsana***
- 14. Stamens (80-)100 or more, usually obscuring the ovary; inflorescence bracts caducous, leaving an evident scar, the most distal ones borne well below the involucre 15
- 14'. Stamens 15-30, not obscuring the usually evident white pilose ovary; ultimate inflorescence units (usually a pair of sessile flowers borne in an involucre) subtended by a pair of opposite, persistent, oblate to suborbicular or ovate-triangular bracts immediately below the unexpanded involucre 16
- 15. Calyx strongly stellate pubescent or strigose-tomentose, sepals 3-4 mm long; peduncles (ultimate inflorescence segment below involucre) densely stellate-strigose, most trichomes with the central branch longer than the others; largest leaves 5-6.5 cm long; low- to mid-elevation humid forest, often on sand, S of Ifanadiana to Ft. Dauphin area and Andohahela PN 6. ***S. gereauii***
- 15'. Calyx glabrous or with scattered stellate indumentum, sepals 5-7 mm long; peduncle glabrous or with even stellate indumentum; largest leaves (5.5-)6-8 cm long; humid forest, Baie d'Antongil to Ft. Dauphin area 5. ***S. exinvolucrata***
- 16. Calyx and involucre densely woolly villous; petals 5-6 mm long; humid forest, Masoala Peninsula 10. ***S. masoalensis***
- 16'. Calyx glabrous or with scattered glandular-capitate indumentum, hyaline and resembling the petals; petals 2.5-4.5 mm long 17
- 17. Inflorescence usually borne on older branches or trunk, open, (8-)10-22 cm long; calyx glabrous except sparsely ciliate along the margin and apex; bracts subtending flowers 2-4 mm long, oblate to orbicular, densely woolly villous below; involucre densely glandular pubescent; humid forest on sand and laterite, Tampolo STF and Zahamena RNI to Manombo RS 2. ***S. cauliflora***

- 17'. Inflorescence borne on young leafy shoots, dense, 1-4(-6) cm long; calyx with scattered short glandular-capitate indumentum below; bracts subtending flowers 1-1.5 mm long, ovate-triangular, sparsely to moderately pubescent; involucre glabrous or with only minute indumentum; subhumid to dry forest, Sambirano (Ambanja to Maromandia) 13. *S. parviflora*
18. Involucre lobes broad, divided about 1/2-2/3 of the way to the base, usually obscuring the fruit, margins dentate with somewhat irregular teeth 1-4(-5) mm long or bearing long processes (4-)8-12 mm long ... 19
- 18'. Involucre lobes narrow, divided nearly to the base, rarely obscuring the fruit, margins lacinate or irregularly dentate, the teeth not exceeding 2(-2.5) mm long 25
19. Leaves coriaceous, margins broadly revolute 20
- 19'. Leaves chartaceous, margin flat or weakly revolute 21
20. Largest leaves 8.5-10.5 cm long, apex rounded to emarginate (rarely acute); petals 4 mm long; involucre in fruit with long, thick processes; humid forest, Anjanaharibe-Sud RS and Masoala PN to Ft. Carnot 7. *S. hystrix*
- 20'. Largest leaves not exceeding 6.5 cm long, apex acute (rounded in a few leaves); petals 5-6 mm long; fruit unknown; Tampoketsa d'Ankazobe 16. *S. tampoketsana*
21. Inflorescence bracts caducous, leaving an evident scar, the most distal ones borne well below the involucre; involucre margin with numerous, soft, fleshy, nearly filiform processes (4-)8-12 mm long; stamens (80-) 100 or more, usually obscuring the ovary in flower 22
- 21'. Inflorescence bracts immediately subtending the involucre persistent, paired, oblate to suborbicular or ovate-triangular; involucre margin somewhat irregularly dentate, the teeth 1-4(-5) mm long; stamens 15-30, not obscuring the usually evident pilose ovary in flower 23
22. Peduncle (ultimate inflorescence segment below involucre) densely stellate-strigose pubescent; largest leaves 5-6.5 cm long; calyx (usually persistent in fruit but often hidden by the involucre) densely stellate pubescent or strigose-tomentose, sepals 3-4 mm long; low- to mid-elevation humid forest, often on sand, S of Ifanadiana to Ft. Dauphin area and Andohahela PN 6. *S. gercaudi*
- 22'. Peduncle glabrous or with scattered minute stellate indumentum; largest leaves (5.5-)6-8 cm long; calyx glabrous or with scattered stellate indumentum, sepals 5-7 mm long; low- to mid-elevation humid forest, probably on laterite, Baie d'Amongil to Ft. Dauphin area 5. *S. exinvolucrata*
23. Calyx and involucre densely woolly villous; petals 5-6 mm long; fruiting material not known; humid forest, Masoala Peninsula 10. *S. masoalensis*
- 23'. Calyx glabrous or with scattered glandular-capitate indumentum, hyaline and resembling the petals; petals 2.5-4.5 mm long 24
24. Inflorescence usually borne on older branches or trunk, open, (8-)10-22 cm long; involucre densely glandular pubescent; bracts subtending involucre 2-4 mm long, oblate to orbicular, densely woolly villous below; humid forest on sand and laterite, Tampolo STF and Berampona RS to Manombo RS 2. *S. cauliflora*
- 24'. Inflorescence borne on young leafy shoots, dense, 1-4(-6) cm long; involucre glabrous or with only minute indumentum; bracts subtending involucre 1-1.5 mm long, ovate-triangular, sparsely to moderately pubescent; subhumid to dry forest, Sambirano (Ambanja to Maromandia) 13. *S. parviflora*
25. Leaves elliptic to obovate, usually less than 2 times as long as wide, distinctly discolorous when dry, lower surface khaki-green, apex rounded to acute, often emarginate; involucre sticky viscous-resinous, shiny when dry; littoral forest on sand and humid forest (probably on laterite), Masoala PN to Ft. Dauphin 4. *S. elongata*
- 25'. Leaves narrowly elliptic to ovate, 2-3 times as long as wide, nearly concolorous when dry, lower surface brownish with a purple tinge, apex acute to acuminate; involucre slightly viscous or without exudate, dull when dry 26
26. Leaves coriaceous, margins strongly revolute, largest blade (10-)13 cm long; Manombo RS 9. *S. manomboensis*
- 26'. Leaves chartaceous to subcoriaceous, margin slightly undulate, largest blade 4-7.5(-9) cm long; mid-elevation humid eastern forest, E of Brickaville, Perinet-Moramanga and Ampasinambo 14. *S. pectinata*

Clé des espèces de *Schizolaena*

1. Feuilles les plus grandes à limbe mesurant moins de 3(-3,5) cm de long 2
- 1'. Feuilles les plus grandes à limbe mesurant plus de (5-)6 cm de long 3
2. Limbe foliaire elliptique ou largement ovale à suborbiculaire, moins de deux fois plus long que large ; pétales à poils étoilés sur la face abaxiale ; terrains granitiques et cipolins, de l'Ibity à l'Isalo 11. *S. microphylla*

- 2'. Limbe foliaire étroitement elliptique à obovale, en général plus de deux fois plus long que large ; pétales glabres sur la face abaxiale ; forêt humide, bassin versant de la Rantabe, Baie d'Antongil 1. *S. capuronii*
3. Pétales densément couverts de poils raides apprimés sur la face abaxiale ; stipules et bractées de l'inflorescence ovales, persistantes (bractées caduques chez *S. milleri*) ; involucre largement à étroitement en forme d'enronnoir dans le fruit, rarement divisé au-delà de la moitié vers la base (aux 2/3 vers la base chez *S. milleri* et *S. rosea*) 4
- 3'. Pétales glabres sur la face abaxiale ; stipules et bractées de l'inflorescence caduques, ou bractées de l'inflorescence persistantes, opposées et suborbiculaires ; involucre divisé au moins à moitié vers la base dans le fruit 8
4. Pétioles et jeunes rameaux pubescents (glabres parfois sur les plus vieux spécimens de *S. cavacoana*, mais dans ce cas l'involucre mesure environ 60 mm de haut à maturité) 5
- 4'. Pétioles et jeunes rameaux glabres (rarement avec des poils étoilés épars) 6
5. Filets des étamines densément pubescents ; feuilles et rameaux courtement tomenteux, poils non ramifiés ; stipules de 5-9 mm de long ; pétales de 5-8 mm de long ; involucre de 15-25(-50) mm de haut à maturité ; forêt sèche, environs d'Ambilobe et Vohemar 18. *S. viscosa*
- 5'. Filers des étamines glabres ; poils étoilés sur les feuilles et les rameaux, en touffes circulaires distinctes ; stipules de 10-12-15 mm de long ; pétales de 15 mm de long environ ; involucre de 60 mm de haut à maturité ; forêt humide, bassin versant de la Rantabe, Baie d'Antongil 3. *S. cavacoana*
6. Feuilles fortement coriaces, ovales (rarement elliptiques), plus larges à la moitié inférieure, apex acuminé, limbe des plus grandes atteignant 11-14,5 cm de long ; forêt littorale sur sable, Ambila-Lemaisro STF, Tampina 8. *S. laurina*
- 6'. Feuilles cartacées à coriaces, elliptiques à légèrement obovales, plus larges vers le milieu, apex aigu à obtus ou arrondi, limbe des plus grandes dépassant rarement 9(-11) cm de long 7
7. Feuilles elliptiques à ovales, en général au moins deux fois plus longues que larges ; pétales de 8-10 mm de long ; sépales de 5-10 mm de long à l'anthesis ; marge de l'involucre étroitement laciniée dans le fruit, dents de 3-9 mm de long ; forêt littorale sur sable, Mahatsara STF et au N de Fr. Dauphin 12. *S. milleri*
- 7'. Feuilles elliptiques à obovales, en général moins de deux fois plus longues que larges ; pétales de 4-5 mm de long ; sépales de 5-6 mm de long à l'anthesis ; marge de l'involucre ± régulièrement dentée dans le fruit, dents de 2-5 mm de long ; forêt littorale sur sable, Tampolo STF 5. *S. rosea*
8. Feuilles hispides-étoilées sur les deux faces, particulièrement le long de la nervure médiane et des nervures latérales, limbe étroitement elliptique-ovale ; (3,5-)4,5-6,5 × 1,5-3, plus de deux fois plus long que large, apex acuminé, base tronquée à subcordée ; pétales roses ; environs du village de Ranomafana à l'est de Fianarantsoa 17. *S. turkii*
- 8'. Feuilles glabres ou à poils épars mais jamais hispides-étoilées, forme et taille variables 9
9. Clé s'appuyant sur le matériel en fleurs (fleurs inconnues chez *S. pectinata*) 10
- 9'. Clé s'appuyant sur le matériel en fruits (fruits inconnus chez *S. tampoketsana* et *S. masaulensis*) 18
10. Feuilles coriaces, marges distinctement révolutes 11
- 10'. Feuilles cartacées, marges plates à peu révolutes 14
11. Feuilles à apex acuminé, limbe des plus grandes mesurant (10-)13 cm de long ; Manombo RS 9. *S. manomboensis*
- 11'. Feuilles à apex arrondi ou émarginé à aigu, limbe des plus grandes ne dépassant pas 10,5 cm de long 12
12. Calice à touffes de poils papilleux-étoilés ; pédoncules (segment ultime de l'inflorescence sous l'involucre) de 4-12 mm de long ; forêt littorale sur sable, de Masoala PN à Fr. Dauphin 4. *S. elongata*
- 12'. Calice uniformément soyeux-étoilé, les branches apprimées des trichomes blanchâtres, de 0,4-0,6 mm de long, orientés vers l'apex ; pédoncules de 1-3(-5) mm de long 13
13. Feuilles les plus grandes mesurant 8,5-10,5 cm de long, apex arrondi à émarginé (rarement aigu), nervures secondaires et tertiaires saillantes dessus ; pétales de 4 mm de long ; involucre muni d'excroissances longues et épaisses dans le fruit ; forêt humide, Anjanaharibe-Sud RS et Masoala PN à Fr. Carnot 7. *S. hystrix*
- 13'. Feuilles les plus grandes ne dépassant pas 6,5 cm de long, apex aigu (arrondi dans quelques cas), nervures secondaires et tertiaires enfoncées ; pétales de 5-6 mm de long ; fruit inconnu ; Tampoketsa d'Ankazobe 16. *S. tampoketsana*
14. Étamines (80-)100 ou plus, masquant habituellement l'ovaire ; bractées de l'inflorescence caduques, laissant une cicatrice visible, les plus distales placées nettement en-dessous de l'involucre 15
- 14'. Étamines 15-30, ne masquant pas l'ovaire blanc-pileux ; les éléments ultimes de l'inflorescence (une paire de fleurs sessiles en général placée à l'intérieur d'un involucre) ont une paire de bractées opposées situées juste sous l'involucre non développé, persistantes, oblées à suborbiculaires ou ovales-triangulaires 16
15. Calice densément étoilé ou strigieux-tometeux, sépales de 3-4 mm de long ; pédoncules (segment ultime

- de l'inflorescence sous l'involucre) densément étoilé-strigieux, la plupart des trichomes à branche centrale plus longue que les autres; feuilles les plus grandes de 5-6,5 cm de long; forêt humide de basse à moyenne altitude, souvent sur sable, du S d'Ifanadiana à la région de Ft. Dauphin et l'Andohahela PN 6. **S. gereau**
- 15' Calice glabre ou à poils étoilés épars, sépales de 5-7 mm de long; pédoncules glabres ou uniformément à poils étoilés; feuilles les plus grandes mesurant (5,5-)6-8 cm de long; forêt humide, de la Baie d'Antongil à la région de Ft. Dauphin 5. **S. exinvolucrata**
16. Calice et involucre densément velu-laineux; pétales de 5-6 mm de long; forêt humide, Presqu'île de Masoala 10. **S. masoalensis**
- 16' Calice glabre ou à poils capités-glanduleux épars, hyalin et ressemblant aux pétales; pétales de 2,5-4,5 mm de long 17
17. Inflorescences portées habituellement sur les vieux rameaux ou sur le tronc, lâches, de (8-)10-22 cm de long; calice glabre en dehors d'une frange ciliée le long de la marge et de l'apex; bractées sous les fleurs de 2-4 mm de long, obliques à orbiculaires, densément velues-laineuses en dessous; involucre densément pubescent-glanduleux; forêt humide sur sable et latérite, de Tampolo STF et Zahamena RNI jusqu'à Manombo RS 2. **S. cauliflora**
- 17' Inflorescences portées sur les jeunes rameaux feuillés, denses, de 1-4(-6) cm de long; calice à courts poils capités-glanduleux épars en dessous; bractées sous les fleurs de 1-1,5 mm de long, ovales-triangulaires, faiblement à modérément pubescentes; involucre glabre ou à poils minuscules; forêt subhumide à sèche, Sambirano (d'Ambanja à Maromandia) 13. **S. parviflora**
18. Involucre à lobes larges, divisé à environ la moitié ou aux 2/3 vers la base, masquant généralement le fruit, les marges portant des dents irrégulières de 1-4(-5) mm de long ou de longues excroissances de (4-)8-12 mm de long 19
- 18' Involucre à lobes étroits, divisé presque à la base, masquant rarement le fruit, marges laciniées ou irrégulièrement dentées, les dents ne dépassant pas 2(-2,5) mm de long 25
19. Feuilles coriaces, marges largement révolutes 20
- 19' Feuilles cartacées, marges plates ou peu révolutes 21
20. Feuilles les plus grandes mesurant de 8,5-10,5 cm de long, apex arrondi à émarginé (rarement aigu); pétales de 4 mm de long; involucre à excroissances longues et épaisses dans le fruit; forêt humide, Anjanaharibe-Sud RS et Masoala PN à Ft. Carnot 7. **S. hystrix**
- 20' Feuilles les plus grandes ne dépassant pas 6,5 cm de long, apex aigu (arrondi dans quelques cas); pétales de 5-6 mm de long; fruit inconnu; Tampoketsa d'Ankazobe 16. **S. tampoketsana**
21. Bractées de l'inflorescence eaduques, laissant une cicatrice visible, les plus distales portées nettement en dessous de l'involucre; marges de l'involucre avec des excroissances nombreuses, souples, charnues, presque filiformes, de (4-)8-12 mm de long; étamines (80-)100 ou plus, masquant généralement l'ovaire dans la fleur 22
- 21' Bractées de l'inflorescence immédiatement sous l'involucre, persistantes, par paires, obliques à suborbiculaires ou ovales-triangulaires; marges de l'involucre dentées ± irrégulièrement, dents de 1-4(-5) mm de long; étamines 15-30, ne masquant pas l'ovaire pileux généralement visible dans la fleur 23
22. Pédoncules (segment ultime de l'inflorescence sous l'involucre) densément étoilé-strigieux; feuilles les plus grandes mesurant 5-6,5 cm de long; calice (généralement persistant dans le fruit mais souvent caché par l'involucre) densément étoilé ou strigieux-tomenteux, sépales de 3-4 mm de long; forêt humide à basse ou moyenne altitude, souvent sur sable, du S d'Ifanadiana à la région de Ft. Dauphin et Andohahela PN 6. **S. gereau**
- 22' Pédoncule glabre ou à minuscules poils étoilés épars; feuilles les plus grandes mesurant (5,5-)6-8 cm de long; calice glabre ou à poils étoilés épars, sépales de 5-7 mm de long; forêt humide à basse ou moyenne altitude, probablement sur latérite, de la Baie d'Antongil à la région de Ft. Dauphin 5. **S. exinvolucrata**
23. Calice et involucre densément velu-laineux; pétales de 5-6 mm de long; matériel fructifère inconnu; forêt humide, Presqu'île de Masoala 10. **S. masoalensis**
- 23' Calice glabre ou à poils capités-glanduleux épars, hyalin et ressemblant aux pétales; pétales de 2,5-4,5 mm de long 24
24. Infrutescences habituellement sur les vieux rameaux ou sur le tronc, lâches, de (8-)10-22 cm de long; involucre densément glanduleux-pubescent; bractées sous l'involucre de 2-4 mm de long, obliques à orbiculaires, densément velues-laineuses en dessous; forêt humide sur sable et latérite, de Tampolo STF et Berampona RNI jusqu'à Manombo RS 2. **S. cauliflora**
- 24' Infrutescences sur les jeunes rameaux feuillés, denses, de 1-4(-6) cm de long; involucre glabre ou à poils minuscules; bractées sous l'involucre de 1-1,5 mm de long, ovales-triangulaires, légèrement à modérément pubescentes; forêt subhumide à sèche, Sambirano (d'Ambanja à Maromandia) 13. **S. parviflora**
25. Feuilles elliptiques à obovales, généralement moins de deux fois plus longues que larges, fortement bico-

- lores sur le sec, face inférieure vert kaki, apex arrondi à aigu, souvent émarginé ; involucre poisseux visqueux-résineux, brillant sur le sec ; forêt littorale sur sable et forêt humide (probablement sur latérite), de Masoala PN à Ft. Dauphin 4. *S. elongata*
- 25'. Feuilles étroitement elliptiques à ovales, 2-3 fois plus longues que larges, presque concolores sur le sec, brunâtre nuancé de pourpre en-dessous, apex aigu à acuminé ; involucre sec ou légèrement visqueux, terne sur le sec 26
26. Feuilles coriaces, à marges fortement révolutes, limbe des plus grandes mesurant (10-)13 cm de long ; Manombo RS 9. *S. manomboensis*
- 26'. Feuilles cartacées à subcoriaces, à marges légèrement ondulées, limbe des plus grandes mesurant 4-7,5(-9) cm de long ; forêt orientale humide de moyenne altitude, E de Brickaville, Périnet-Moramanga et Ampasinambo 14. *S. pectinata*

1. *Schizolaena capuronii* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, sp. nov.

Arbor 20-25 m alta. Folia stipulis ignotis; petiolo 3-5 mm longo, parce stellato-pubescente; lamina anguste elliptica ad obovata, subcoriacea, (1.6-)2-3.5 × (0.6-)1-1.7 cm, longitudine latitudinem plerumque plus quam duplo excedente, apice rotundata truncata reusave, margine integra revoluta, basi acuta ad anguste rotundata, nervis secundariis 5- vel 6-jugatis. Inflorescentia pedunculo 3-5 mm longo dense papilloso-stellato-strigosa insidens ex cyma axillari 6- ad 10-flora semel vel bis ramificante constans; bracteis caducis involucre sub anthesi 4- vel 5-lobulata, dense papilloso-stellato-strigosa, flores sessiles (unum vel) duos circumcludente. Flos sepalis late ovatis orbicularibus suboblatisve, 3.5-4 mm longis, adaxialiter minute tomentosus, abaxialiter dense laeve stellato-strigosis; petalis in sicco chartaceis, ca. 3.5 × 3 mm, glabris, apice rotundatis; staminibus ca. 60 ad 80, filamentis ca. 2 mm longis, glabris; stylo ca. 2.5 mm longo striis verticalibus minutis ornato; stigmatibus truncato, brevipiloso. Fructus ignotus.

TYPUS.—*Service Forestier (Capuron) 9092, Madagascar, Prov. Toamasina, bassin de la Manonga (affluent rive gauche de la Rantabe) aux environs de Sahajinja, crête, [15°38'S, 49°25'E], 750 m, 1 Mar. 1953, fl. (holo-, P!; iso-, MO!, P!, TEF).*

Large trees 20-25 m tall, trunk to 70 cm dbh. Twigs with short, scattered papillose stellate indumentum. Leaves narrowly elliptic to obovate, dark chocolate-brown occasionally tinged slightly orangish-red above, khaki-tan below (in dry material), subcoriaceous, (1.6-)2-3.5 × (0.6)1-1.7 cm, mostly greater than 2 times as long as wide, glabrous except for scattered stellate indumentum on the midvein below, apex rounded to truncate or retuse, margin entire, revolute, base acute to narrowly rounded, venation brochidromous, with 5-6 pairs of alternate to subop-

posite secondary veins joined by depressed-rounded arches, midrib weakly channeled above, raised below; petiole 3-5 mm long, sparsely stellate pubescent; stipules unknown, caducous, leaving small scars. Inflorescences small, axillary, 6-10-flowered, once- or twice-branched cymes, primary axis 5-12 mm long, with sparse to moderately dense stellate indumentum, bracts caducous, peduncles (secondary axes) usually 2, 3-5 mm long, with an evident bract scar at the base, densely yellow-orange papillose stellate-strigose, with the central trichome branch much longer than the others, involucre in flower 4-5-lobed, densely papillose stellate-strigose, containing (1-)2 sessile flowers; sepals 3, imbricate, broadly ovate to orbicular or slightly oblate, adaxially concave, 2 mm long in bud, expanding to 3.5-4 mm at anthesis, minutely tomentose on adaxial surface, densely smooth stellate-strigose on abaxial surface, apex rounded; petals 5, broadly obovate, chartaceous when dry, 3.5 × 3 mm, glabrous, apex rounded; stamens ca. 60 to 80, filaments slender, ca. 2 mm long, glabrous, anthers ellipsoid, 0.2 mm long; ovary depressed-globose, densely pilose, 3-locular; style cylindrical, somewhat contorted in dry material, ca. 2.5 mm long, with minute vertical striations, stigma terminal, truncate, short-pilose. Fruit unknown.—Fig. 1.

Schizolaena capuronii, a large tree 20-25 m tall, is known only from the type material collected in the Manonga River valley, a part of the Rantabe watershed in the Baie d'Antongil area (Fig. 2A). The specimens were annotated by CAPURON as "*S. hystrix* var. *parvifolia*", although the name was never published. Both he and later LEROY

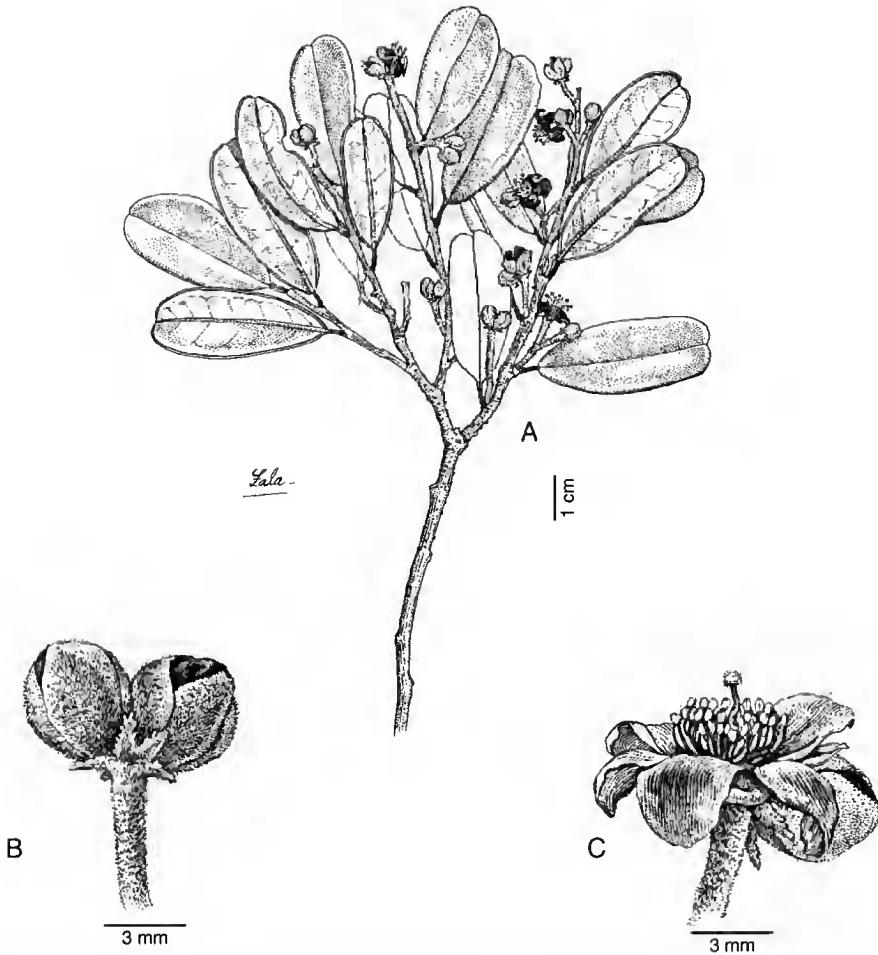


Fig. 1.—*Schizolaena capuronii*: A, flowering branch; B, peduncle with paired buds; C, flower at anthesis. (Service Forestier 9092).

(1975) recognized a strong resemblance between this collection and material of *S. hystrix*, especially with several specimens taken from the upper Rantabe watershed, one of which was probably gathered from very near the type locality of *S. capuronii*. Although the overall appearance of the inflorescence in the two species is indeed very similar, as is the discoloured nature of their leaves, a number of important differences in foliar features are also evident. The leaves in *S. hystrix* are strongly coriaceous, and range from 6 to 10.5 cm in length (excluding reduced leaves of the inflorescences), and have 10-12 secondary veins, whereas in *S. capuronii* they are consider-

ably thinner, much smaller (2-3.5 cm long), and have only 5-6 secondary veins. It is possible that the material of *S. capuronii* represents only a localized phenotype of *S. hystrix* with highly reduced leaves, perhaps associated with its occurrence on a ridge line where it would presumably be exposed to wind. If that were so, however, one might not expect the leaves to have changed so strikingly in texture and number of secondary veins. In any case, until additional field work can be undertaken in the area, it seems best to recognize *S. capuronii* as distinct at the species level.

ETYMOLOGY.—The specific epithet honors the

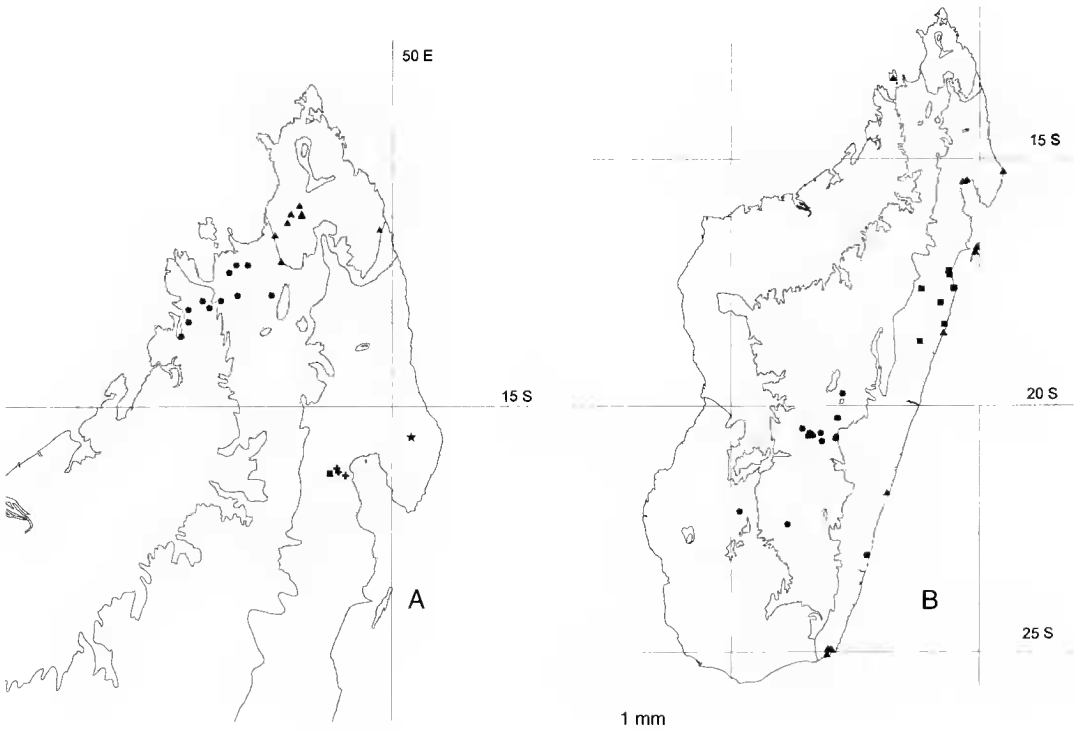


Fig. 2.—Distributions of *Schizolaena*, mapped on the bioclimatic zones of Madagascar (after CORNET 1974). A, *S. capuronii* (■), *S. cavacoana* (+), *S. masoalensis* (*), *S. parviflora* (●), *S. viscosa* (▲); B, *S. cauliflora* (■), *S. elongata* (▲), *S. microphylla* (●).

eminent forest boranist René CAPURON, whose highly productive field work and taxonomic research have contributed perhaps more than that of anyone else to our knowledge of Madagascar's woody flora, including Sarcolaenaceae.

2. *Schizolaena cauliflora* Thouars

Hist. Vég. Isles Austr. Afriq.: 43 (1805).—Type: *Thouars s.n.*, Madagascar, without precise locality (holo-, P!; iso-, P!).

Schizolaena cauliflora is a tree 6-15 m tall, occurring mostly in littoral forest on sand from Tampolo STF to Andrianrantly near Brickville,

and inland to Zahamena RNI, with two somewhat atypical collections from Betampona RNI and Manombo RS having more acuminate leaves (Fig. 2B). This small-flowered species appears to be unique within the genus in having its inflorescences borne on the trunk or older branches. It has been collected only four times since the 1950s, thrice from Mahatsara STF forest near Foulpointe and once from Berampona RNI.

VERNACULAR NAMES.—Arina, Tsiarinarina, Voandrozana.

MATERIAL EXAMINED.—MADAGASCAR: *Andrianarisata* 248, Betampona RNI; *Humblot* 196, Nosive;

Miller 8812, Mahatsara STF; Noyes 958, Mahatsara STF; Perrier de la Bâthie 7085, Fenerive; A. Randrianasolo 473, Mahatsara STF; Réserves Naturelles 3162, Zahamena RNI; Service Forestier 150-R-631, Mahatsara STF, 10032, 16684, Andriantantely, 10808, 12623, 12804, 16098, Tampolo STF, 16475, 23649, Manombo RS; Thouars s.n., without precise locality; Thouars 32736, 32930, 34721, 34676, Mahatsara STF.

3. *Schizolaena cavacoana* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, *sp. nov.*

Arbor 30-35 m alta. Folia stipulis geminatis liberis subcoriaceis ovatis subsistentibus. (10-)12-15 × 6-12 mm, apice acuminatis; petiolo 10-12 mm longo, parce stellato-pubescente; lamina elliptica ad ovata, subcoriacea, ca. 14 × 2.5-6.5 cm, apice acuminata, margine integra minute incrassata, basi obtusa ad rotundata, nervis secundariis 9- ad 12-jugatis. Inflorescentia pedunculo 7-10 mm longo dense papilloso-stellato-strigoso insidens ex panicula terminali 10- ad 20-flora modice ramosa constans; bracteis stipulas simulantibus; involucre sub anthesi apice 30- ad 40-lobulato flores sessiles duos circumcludente. Flos sepalis orbicularibus ad late ovatis, 5-10 mm longis, adaxialiter minute tomentosis, abaxialiter dense laeve stellato-strigosis; petalis in sicco chartaceis, ca. 15 × 15 mm, adaxialiter glabris, abaxialiter praeter prope marginem dense pallide aureo-tomentosis, apice rotundatis, basi angustatis subungiculatis; staminibus ca. 120 ad 150, filamentis 6-8 mm longis, glabris; stylo ca. 10 mm longo; stigmatibus minute trilobulato, glabro. Fructus subglobosus diametro ca. 14 mm, parce pilosus, sepalis persistentibus aique involucre late infundibuliformi maturitate 50-60 mm alto in lobulos 5 late triangulares minus quam quarta parte ad basin divisio margine dentibus 30 ad 40 3-5 mm longis minuto subtentis; seminibus ignotis.

TYPUS.—Service Forestier (Capuron) 9167, Madagascar, Prov. Toamasina, basse Vohilava (affluent rive gauche de la Rantabe) entre Andratombe et Mafaipoza, [15°39'S, 49°34'E], 50 m, Apr. 1954, fl. (holo-, P!; iso-, MO!, P!).

Large trees 30-35 m tall, trunk to 80-100 cm dbh. Twigs with dense stellate-tomentose indumentum. Leaves elliptic to ovate, grayish-brown above, chocolate-brown tinged reddish below (in dry material), subcoriaceous, 6-14 × 2.5-6.5 cm, glabrous above, sparsely stellate pubescent below, especially on the midrib and veins, apex acuminate, margin entire, minutely thickened, base obtuse to rounded, venation brochidodromous, with 9-12 pairs of alternate to subopposite

secondary veins joined by angular arches, midrib not channeled above, raised below; petiole 10-12 mm long, sparsely stellate pubescent; stipules paired, free, subcoriaceous, somewhat persistent, ovate, (10-)12-15 × 6-12 mm, glabrous above, stellate-strigose below, some trichomes with the central branch much longer than the others, apex acuminate. Inflorescences terminal, 10-20-flowered, moderately branched panicles, axes to ca. 7 mm long, moderately to densely stellate pubescent, bracts similar to stipules, upper ones somewhat reduced, peduncles (ultimate axes below involucre) 7-10 mm long, densely yellow-orange papillose stellate-strigose, involucre in flower with 30-40 small, bulbous lobes along the rim, containing 2 sessile flowers; sepals 3, imbricate, orbicular to broadly ovate, adaxially concave, 5-10 mm long in bud, expanding only slightly at anthesis, minutely tomentose on adaxial surface, densely smooth stellate-strigose on abaxial surface, apex rounded; petals 5, broadly obovate, chartaceous when dry, 15 × 15 mm, glabrous on adaxial surface, densely light golden tomentose on abaxial surface except near the margin, apex rounded, base narrowed and almost clawed; stamens ca. 120 to 150, filaments slender, ca. 6-8 mm long, glabrous, anthers ellipsoid, 0.6-0.8 mm long; ovary broadly conical, densely woolly tomentose, 3-locular, style cylindrical, somewhat contorted in dry material, ca. 10 mm long, stigma terminal, minutely 3-lobed, glabrous. Fruit subglobose, ca. 14 mm in diam., sparsely pilose, dehiscent by 3 longitudinal sutures, exocarp bony, sepals persistent, involucre greatly expanded, broadly funnelform, yellow, fleshy (?), 50-60 mm high at maturity, with 5 shallowly triangular lobes divided less than 1/4 of the way to the base, margin with 30-40 dentate teeth 3-5 mm long; seeds unknown.—Fig. 3.

Schizolaena cavacoana is known from only three collections (one each in bud, flower, and fruit) made in 1954 in the Vohilava River valley, part of the Rantabe watershed in the Baie d'Antongil area (Fig. 2A). It is easily distinguished by its particularly large, persistent stipules, very large flowers, and greatly expanded and shallowly lobed funnelform involucre reaching to 50-60 mm in height at maturity.

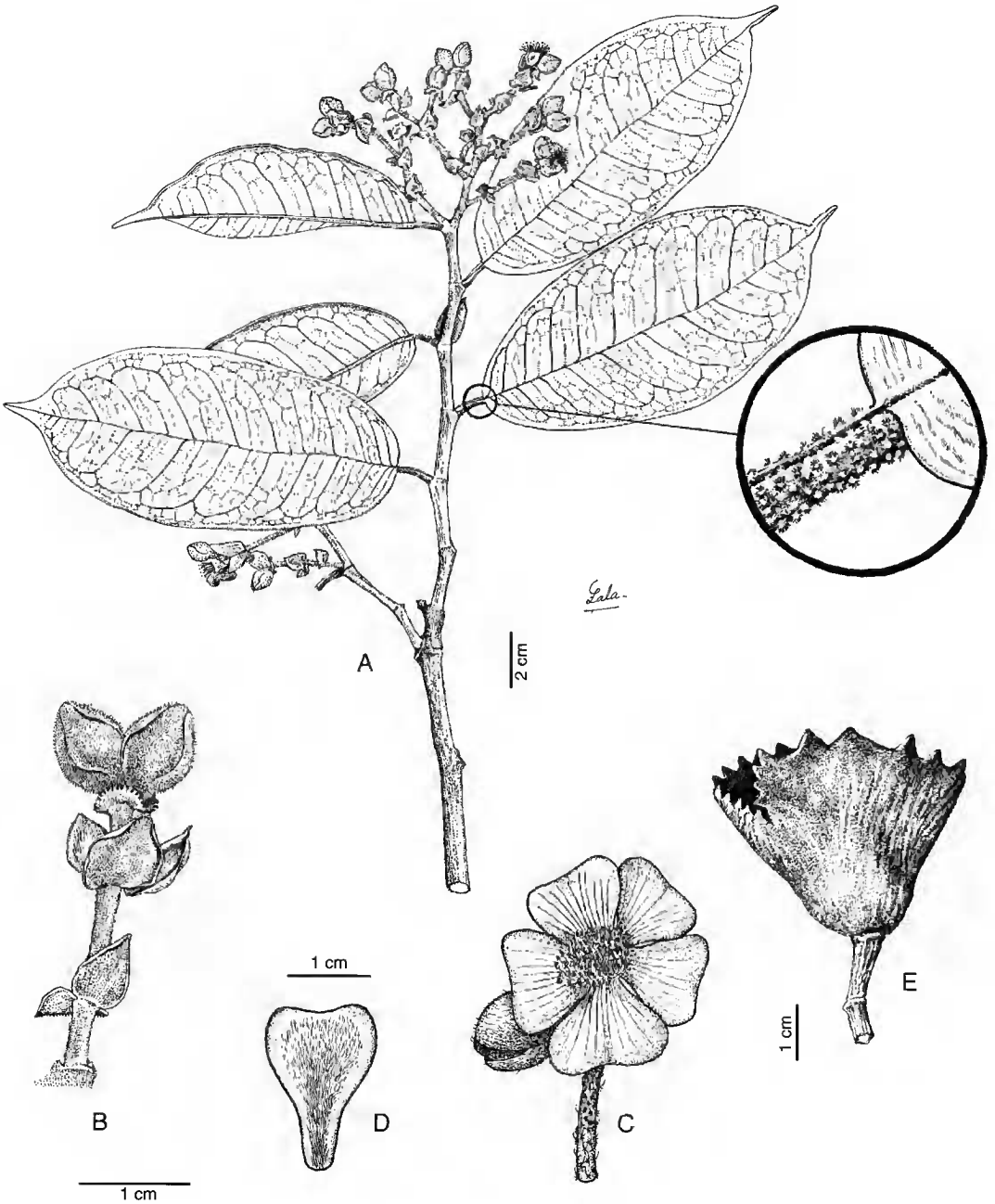


Fig. 3.—*Schizolaena cavacoana*. A, flowering branch; B, peduncle with paired buds and persistent bracts; C, flower; D, petal (abaxial surface); E, immature involucre. (Service Forestier 9167).

ETYMOLOGY.—This specific epithet was proposed by the third author (as "*S. cavacoï*") in honor of Alberto J.L. CAVACO, whose research conducted at the Laboratoire de Phanérogamie from 1950 until his retirement in 1975 resulted in many published works, including the treatment of Sarcolaenaceae and ten other families in the *Flore de Madagascar*, either as sole author or in collaboration with others.

VERNACULAR NAME.—None recorded.

PARATYPES.—MADAGASCAR, *Prov. Toamasina*: *SF* (*Capuron*) 9111, Bassin de la Vohilava (affluent rive gauche de la Rantabe), au village de Sahamalaza, [15°37'S, 49°30'E], 500 m, 6 Mar. 1954, fr. (MO, P, TEF); *SF* (*Capuron*) 9127, Bassin de la Vohilava (affluent rive gauche de la Rantabe), entre Sahamalaza et Vohilava, [15°35'S, 49°29'E], 10 Mar. 1954, bud (P).

4. *Schizolaena elongata* Thouars

Hist. Vég. Isles Austr. Afriq.: 43 (1805).—Type: *Thouars s.n.*, Madagascar, without precise locality (holo-, P!; iso-, P!).

A tree 4-15(-20) m tall, *Schizolaena elongata* is restricted to littoral forest on sand, extending along most of the E coast, from Cap Est on the Masoala Peninsula to Vinanibe just S of Ft. Dauphin (Fig. 2B). It can be recognized by its coriaceous, discolorous leaves with a rounded to acute, often emarginate apex and its narrow, lacinate, sticky viscous-resinous involucre lobes that only partially obscure the fruit. *Schizolaena elongata* has been collected many times recently in the area just N of Ft. Dauphin, but has not been recorded from elsewhere in its range since 1969.

VERNACULAR NAMES.—Fotondahy, Vaondro-zanalahy.

MATERIAL EXAMINED.—MADAGASCAR: *Baron* 6100, without precise locality; *Bernier s.n.*, Anrongil; *Dumetz* 1146, Mandena STF; *Gereau* 3387, Mandena; *McPherson* 14232, 14365, 14660, Mandena STF; *Perrier de la Bâthie* 3014, Faraony; *Rabevoitra* 2363, Vinanibe, 2415, Mandena STF; *Richard* 24, Sainte Marie, 609, Nosy-Be; *Service Forestier* 397, Mandena STF, 5706, 6477, Tampina, 8190, Mandena STF, 8624, 15845, Tampolo STF,

18276, Varingotra, 27774, Cap-Est, 28871, Ambohidena; *Thouars s.n.*, without precise locality.

5. *Schizolaena exinvolucrata* Baker

J. Linn. Soc., Bot. 20: 97 (1883).—Type: *Gérard* 20, Madagascar, without precise locality, Nov. 1865 (holo-, K!).

Rhodolaena echinata Perrier, Bull. Soc. Bot. France 78: 61 (1931).—Type: *Perrier de la Bâthie* 18117, Madagascar, Prov. Toamasina, bords des rivières entre Moramanga et Anosibe, 600 m, Oct. 1923 (holo-, P!; iso-, P!).

Schizolaena exinvolucrata is a tree 6-15 m tall, occurring in humid forest at low elevation from the Rantabe watershed in the Baie d'Antongil area to the Forêt de Bemangidy N of Ft. Dauphin (where it is apparently sympatric with *S. milleri*), and extending inland to Betampona RNI and the area S of Moramanga (Fig. 4A). It is distinguished by its nearly glabrous peduncle and sepals, which are 5-7 mm long, and by its glabrous involucre with long, narrow, fleshy processes. *Schizolaena exinvolucrata* has been collected recently at Betampona RNI and Andohahela PN.

VERNACULAR NAMES.—Hazombato, Mampisaraky, Tanatanompotsy.

MATERIAL EXAMINED.—MADAGASCAR: *Andrianarisata* 135, 221; *Debray* 1857, Betampona RNI; *Humboldt* 354, without precise locality; *Lowry* 4451, Andohahela PN; *Perrier de la Bâthie* 17007, Lohavanana, 18117, Moramanga, 18121, Nosivolo; *Randriamampionona* 445, 459A, Andohahela PN; *Randrianjanaka* 90, Zahamena RNI; *Reserves Naturelles* 6182, Betampona RNI; *Scout Ellior* 2841, Fort Dauphin; *Service Forestier* 2485, Soanierana-Ivongo, 6124, Mangoro, 8912, Mahaso, 9043, Antsambalahy, 11803, Bemangidy, 23706, Mont Vatovavy.

6. *Schizolaena gereau* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, sp. nov.

Fruetex vel arbor 4-10 m alta. *Folia stipulis geminatis longitudinis per ca. dimidium connatis hyalinis lanceolatis*, 4-5 × 0.8-1 mm, adaxialiter glabris, abaxialiter dense stellato-strigosis, apice anguste acutis; *petiolo* 3-5 mm longo, glabro vel parce strigoso; *lamina elliptica vel subobovata, chartacea*, 2.5-6.5 × 1.3-3.2 cm, apice acu-

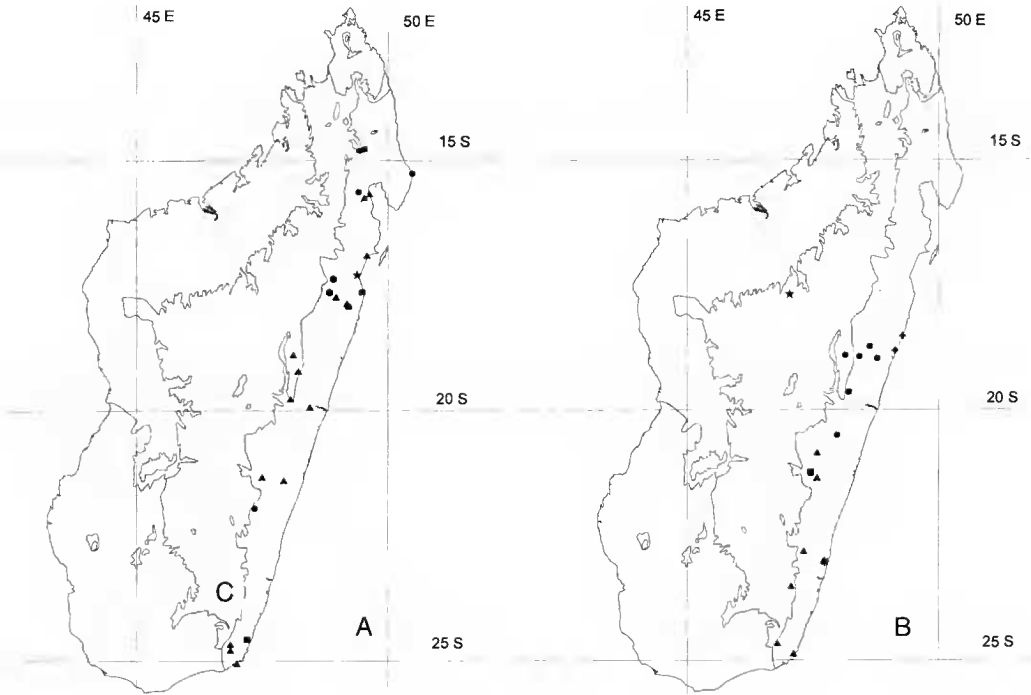


Fig. 4.—Distributions of *Schizolaena*, mapped on the bioclimatic zones of Madagascar (after CORNET 1974). A, *S. exinvolucrata* (▲), *S. hystrix* (●), *S. milleri* (■), *S. rosea* (★); B, *S. gereauli* (▲), *S. laurina* (⊕), *S. manomboensis* (★), *S. pectinata* (●), *S. tampoketsana* (★), *S. turkii* (■).

minata, margine integra minute incrassata, basi acuta, nervis secundariis 7- ad 10-jugatis. Inflorescentia pedunculo 1-1.5 mm longo dense stellato-strigosa, insidens ex cyma axillari 1- ad 3-(ad 6-) flora parce ramosa constans; bracteis calyptivatis hyalinis; involucre sub anthesi ex annulo leviter 5-lobulato florem solitarium circumcludente constante. Flos sepalis late ovatis, 3-4 mm longis, adaxialiter glabris, abaxialiter dense stellato-vel strigoso-tomentosis; petalis in sicco membranaceis, 3-5 × 2-3 mm, adaxialiter parce sericeis, abaxialiter glabris, apice rotundatis; staminibus ca. 100 ad 120, filamentis ca. 1.5 mm longis, glabris; stylo ca. 2 mm longo; stigma truncato, glabro. Fructus globosus diametro 6-10 mm, madice stellato-strigosus, sepalis plerumque persistentibus subtenentibus atque involucre 15-18 mm alto glabro in lobulos latos 5 dimidia usque ad duas tertias

parte ad basim diviso margine laciniis ca. 50 ad 70 anguste lanceolatis ad filiformibus maturitate (4-)6-12 mm longis munito pro parte maxima obtectus.

TYPUS.—Gereau, Dumetz & Rabevobitra 3314, Madagascar, Prov. Joliana, foot trail beyond end of track on N side of Antorendrika River, well-developed littoral forest among marshes on light gray sand, ca. 22 km N of Ft. Dauphin, 24°52'S, 47°07'E, 0-20 m, 22 Mar. 1989 (holo-, MO; iso-, A, K!, LE, P!, RSA, TAN).

Large shrubs to trees 4-10 m tall, trunk to 30 cm dbh. Twigs with dense stellate-strigose indumentum, most trichomes with the central branch

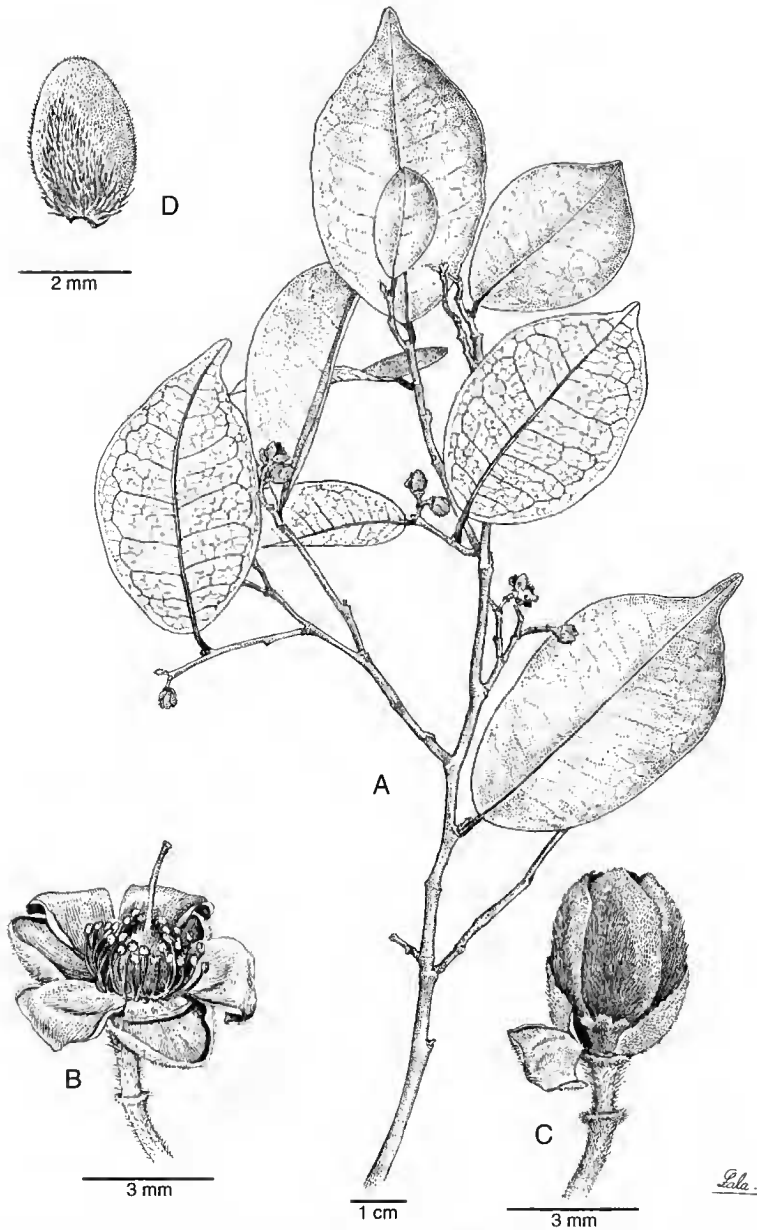


Fig. 5.—*Schizolaena gereauii*: A, flowering branch; B, flower at anthesis; C, peduncle with bud, sepals, and caducous bracts; D, sepal (abaxial surface). (Gereau *et al.* 3314).

much longer than the others. Leaves elliptic to slightly obovate, dark chocolate brown tinged purplish above, khaki green below (in dry material), chartaceous, 2.5-6.5 × 1.3-3.2 cm, glabrous, or sparsely stellate-strigose on midrib below, apex

acuminate, margin entire, minutely thickened, base acute, venation brochidodromous, with 7-10 pairs of alternate to subopposite secondary veins joined by depressed-rounded arches, midrib weakly channeled above, raised

below; petiole 3-5 mm long, glabrous to sparsely strigose; stipules 2, fused ca. 1/2 their length, hyaline, lanceolate, 4-5 × 0.8-1 mm, glabrous above, densely stellate-strigose below, apex narrowly acute. Inflorescences axillary, 1-3(-6)-flowered, sparsely branched cymes, axes 2-3 mm long, densely short stellate-strigose, bracts calyptrate, hyaline, densely stellate-strigose, peduncles (ultimate axes below involucre) 1-1.5 mm long, densely stellate-strigose, involucre in flower a shallowly 5-lobed rim, containing a single sessile flower; sepals 3, imbricate, broadly ovate, adaxially concave, 2.5-3 mm long in bud, expanding to 3-4 mm long at anthesis, glabrous on adaxial surface, densely stellate pubescent or strigose-tomentose on abaxial surface, apex rounded; petals 5, elliptic to slightly ovate, membranaceous when dry, 3-5 × 2-3 mm, sparsely sericeous on adaxial surface, glabrous on abaxial surface, apex rounded; stamens ca. 100-120, filaments slender, ca. 1.5 mm long, glabrous, anthers ovoid, 0.2 mm long; ovary globose, densely tomentose, 3-locular, style cylindrical, contorted in dry material, ca. 2 mm long, stigma terminal, truncate, glabrous. Fruit globose, 6-10 mm in diam., moderately stellate-strigose, dehiscent by 3 longitudinal sutures, exocarp cartilaginous, sepals usually persistent, involucre expanded, 15-18 mm high, glabrous, with 5 broad lobes divided 1/2-2/3 of the way to the base, largely obscuring the fruit, margin with ca. 50-70 narrowly lanceolate to filiform processes each (4-)6-12 mm long at maturity; seeds 1 per locule, obovoid, ca. 4 mm long, with scattered peltate scales, hylum depressed-concave.—Fig. 5.

A large shrub to tree 4-10 m tall, *Schizolaena gereau* occurs primarily on sandy substrates in humid forest from S of Ifanadiana to Andohahela PN (Fig. 4B), with populations extending from near sea level to perhaps 300-400 m elevation. It is distinguished from *S. exinvolucrata* by its densely stellate pubescent peduncles and calyx, the latter 3-4 mm long, and by an involucre with long, narrowly lanceolate to filiform, fleshy processes along the margin. Some specimens at P were annotated as "*S. vona*" by the third author, but this name was never validly published.

ETYMOLOGY.—The specific epithet honors our colleague Roy E. GERAU, who participated in botanical inventory work in the Ft. Dauphin area during which the type material was collected.

VERNACULAR NAMES.—Mampisaraka, Sari-vona, Vona.

PARATYPES.—MADAGASCAR, *Prov. Fianarantsoa*: Decary 5334, Vondrozo, [22°49'S, 47°19'E], 17 Sep. 1926, fr. (K, MO, P[2 sheets]); *SF (Rakotonanana)* 2233, Mahombo RS, Tokahandra, [23°04'S, 47°44'E], 0-50m, 6 Apr. 1950, fl. (P); *SF 16188*, Amboindriha, Vohilava, Canton d'Andranolalina, Dist. de Midongy du Sud, [23°31'S, 47°04'E], 13 Apr. 1956, fl. (P, TEF); *SF 19973*, Ambohimanga-Atsimo, Analakely, Masoarovana, Canton d'Ambohimanga-S, Dist. d'Ifanadiana, bord de ruisseau Manadriana, [20°52'S, 47°35'E], 25 Sep. 1961, fr. (P, TEF); *SF (Capuron)* 23729, Ranomafana PN, E Chutes de la Namoroa, S d'Ifanadiana, près du village de Mangalanihenitra, [21°22'S, 47°35'E], 24 Oct. 1954, fr. (P, TEF); *SF (Randriamiera)* 26049, Andohahela PN, Emanara, bord de la rivière, 18 Apr. 1966, fl. (TEF). *Prov. Tohiana: Rabevohitra 1807*, N de Marokoky, F. de Belavenona, sur dunes littorales, 24°52'S, 47°07'E, 0-20 m, 31 Mai. 1989, fl. (MO, P, TEF); *Randriamampionona 325*, Andohahela PN, Parcelle 1, vicinity of Eminiminy, 24°40'S, 46°48'E, 200-700 m, 4-24 May 1993, fl. (MO[2 sheets], P, TAN); *Randriamampionona 571*, Andohahela PN, Parcelle 1, southwest of Eminiminy, Manaravona River, 24°40'S, 46°48'E, 200-700 m, 9 Aug. 1993, y.fr. (MO[2 sheets], P, TAN).

7. *Schizolaena hystrix* Caputon

Adansonia, sér. 2, 3: 393 (1963).—Type: *Service Forestier (Capuron)* 9090, Madagascar, Prov. Toamasina, bassin de la Manongo (affluent rive gauche de la Rantabe), aux environs de Sahajinja, [15°38'S, 49°25'E], 700 m, 1 Mar. 1954 (holo-, P!; iso-, MO!, P!, TEF).

Schizolaena hystrix is a large tree 15-35 m tall, occurring in humid forest from Anjanaharibe-Sud RS and Masoala PN to Ft. Carnot (Fig. 4A). The most distinctive features of this species are its large, very coriaceous leaves with both the apex and base rounded or truncate, and the involucre with particularly stout processes, giving it the appearance of a very small porcupine, from which the specific epithet was derived.

Schizolaena hystrix is known from five collections made in the 1950s, and was recently recorded for the first time at Masoala PN in 1994 and at Anjanaharibe-Sud RS in 1995 and 1997.

VERNACULAR NAMES.—Hazoandatra, Voah-tsilepaka.

MATERIAL EXAMINED.—MADAGASCAR: *McPherson* 17260, Anjanaharibe-Sud RS; *Rahajao* 825, Masoala PN; *Ravelonarivo* 791, Anjanaharibe-Sud RS; *Réserves Naturelles* 6898, Zahamena RNI, 9132, Betampona RNI; *Service Forestier* 521-R-56, Befody, 9090, Sabajinja, 9699, Tsianivohlo, 18135bis, Betampona RNI, 29483bis, Zahamena RNI.

8. *Schizolaena laurina* Baillon

Bull. Soc. Linn. Paris 1: 571 (1886).—Type: *Chapelier s.n.*, Madagascar, without precise locality (holo-, P!).

Schizolaena laurina is restricted to littoral forest on sand at Ambila-Lemaitso STF and Tampina (Fig. 4B), and can be recognized by its large, coriaceous, ovate leaves with an acuminate apex. It closely resembles *S. rosea*, but can be distinguished by its papillose stellate-strigose calyx in which the central branch of the trichomes is longer than the others (the calyx is evenly woolly stellate pubescent in *S. rosea*), and its glabrous involucre (vs. stellate pubescent in *S. rosea*). *Schizolaena laurina* has not been recorded since 1966, despite extensive collecting in the remnant forests around Ambila-Lemaitso.

CAPURON (1963) placed *Schizolaena laurina* in synonymy under *S. rosea*, indicating that features of the involucre, fruit and inflorescence bracts are identical in the two species, and that the only differences could be found in the shape of the leaves. However, CAPURON used a broad circumscription of *S. rosea* that also included material now placed in *S. cavacoana*, which probably caused some confusion in his understanding of character distribution within this closely related group.

VERNACULAR NAME.—Arina.

MATERIAL EXAMINED.—MADAGASCAR: *Boiteau* 464, Ambila-Lemaitso STF; *Chapelier s.n.*, without precise

locality; *Louvel s.n.*, without precise locality; *Perrier de la Bâthie* 13268, Tampina; *Poivre s.n.* [P-JUSS no. 11971b], without precise locality; *Service Forestier* 1571, 5663, 5694, 5859, Ambila-Lemaitso STF, 6479, Tampina, 17731, 19190, Ambila-Lemaitso STF.

9. *Schizolaena manomboensis* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, sp. nov.

Arbor 10–25 m alta. *Folia* stipulis ignatis; petiolo 8–14 mm longo, primum minute stellato-pubescente, deinde glabro; lamina anguste ovata ad elliptica, coriacea, 6–13 × 2–6.5 cm, longitudine latitudinem duplo vel triplo excedente, apice acuminata, margine integra valde revoluta, basi acuta ad rotundata, nervis secundariis 8 ad 12-jugatis. Inflorescentia pedunculo 3–8 mm longo dense papilloso-stellato-strigoso insidens ex panicula axillari (ut videtur terminali post lapsum foliorum) paucivulvo multiflora ramosa constans; bracteis caducis; involucre leviter 5-lobulato, dense stellato-strigoso, flos sessiles, duos circumcludente. Flos sepalis orbicularibus ad late ovatis, 3.5–5 mm longis, adaxialiter minute tomentosis, abaxialiter dense breviter stellato-strigosis; petalis in sicco chartaceis, ca. 6 × 3.5 mm, glabris, apice rotundatis; staminibus ca. 100 ad 120, filamentis ca. 3 mm longis, glabris; stylo 3–4 mm longo; stigma minute trilobulato, glabro. Fructus globosus diametro 6–10 mm, dense papilloso-stellato-pubescent, involucre maturitate 10–15 mm alto parce stellato-pubescente in lobulis anguste lanceolatos 5 unoquoque irregulariter in 5 ad 8 laciniis 1–2 mm longas fesso fere usque ad basim divisio partim tantum obtectus; seminibus ignotis.

TYPE.—*Service Forestier* (Capuron) 23630, Madagascar, Prov. Fianarantsoa, Manombo RS, sur latérite de basalte, [23°02'S, 47°44'E], 17 Oct. 1964, fr. (holo-, P!; iso-, P!).

Trees 10–25 m tall, trunk to 70 cm dbh. Twigs with minute stellate indumentum. Leaves narrowly ovate to elliptic, brown, shiny above, light orangish-brown, dull below (in dry material), coriaceous, 6–13 × 2–6.5 cm (reduced in inflorescences), 2–3 times as long as wide, glabrous, or minutely stellate pubescent on midrib below, apex acuminate, margin entire, strongly revolute, base acute to rounded, venation brochidodromous, with 8–12 pairs of alternate to subopposite secondary veins joined by depressed-rounded arches, midrib shallowly channeled above, conspicuously raised below; petiole 8–14 mm long, minutely stellate pubescent, later glabrous; stipules unknown, caducous (?), scars obscure.

Inflorescences axillary (but appearing terminal when leaves have fallen), few- to many-flowered, branched panicles, axes to 70 mm long, densely mealy papillose stellate-strigose, most trichomes with the central branch longer than the others, bracts chartaceous, caducous, narrowly ovate, ca. 3×1 mm, glabrous above, minutely stellate-strigose below, apex acuminate, base acute, peduncles (ultimate axes below involucre) 3-8 mm long, densely brownish-orange papillose stellate-strigose, involucre in flower shallowly 5-lobed, densely stellate-strigose, containing 2 sessile flowers; sepals 3, imbricate, orbicular to broadly ovate, adaxially concave, 3.5-5 mm long in bud, expanding only slightly at anthesis, minutely tomentose on adaxial surface, densely short stellate-strigose on abaxial surface, apex rounded; petals 5, elliptic, chartaceous when dry, ca. 6×3.5 mm, glabrous, apex rounded; stamens ca. 100-120, filaments slender, ca. 3 mm long, glabrous, anthers subglobose, 0.2 mm long; ovary depressed-globose, densely woolly tomentose, 3-locular, style cylindrical, contorted in dry material, ca. 3-4 mm long, stigma terminal, minutely 3-lobed, glabrous. Fruit globose, 6-10 mm in diam., densely papillose stellate pubescent, some trichomes with the central branch longer than the others, dehiscent by 3 longitudinal sutures, exocarp bony, involucre expanded, 10-13 mm high at maturity, sparsely stellate pubescent, with 5 narrow, lanceolate lobes divided nearly to the base, only partially obscuring the fruit, margin of each lobe irregularly lacinate, with 5-8 narrow teeth ca. 1-2 mm long; seeds unknown.—Fig. 6.

Schizolaena manomboensis, a tree 10-25 m tall, closely resembles *S. elongata* and especially *S. pectinata*, with which it shares a mature involucre characterized by narrow, irregularly lacinate lobes divided nearly to the base that only partially hide the fruit. The leaves of *S. manomboensis* are, however, larger and distinctly coriaceous, with a shiny upper surface and strongly revolute margins, whereas in *S. pectinata* they are smaller, chartaceous and dull above, with slightly undulate margins. *Schizolaena manomboensis* differs from *S. elongata* by having leaves that are narrowly ovate to elliptic and concolorous (versus

elliptic to obovate and distinctly discolorous) with an acuminate (versus acute to rounded or emarginate) apex.

Schizolaena manomboensis is known from only three collections, all from humid forest on the laterite parcel of Manombo RS (Fig. 4B), which has been less heavily degraded than the nearby littoral forest parcel on sand (cf. RABEVOHITRA et al. 1998). The most recent collection of this species was made in 1964.

VERNACULAR NAME.—Bemahova, Sandrifatra.

PARATYPES.—MADAGASCAR, *Prov. Fianarantsoa: Service Forestier 13967*, Manombo RS, jardin botanique 16, [23°03'S, 47°44'E], 24 Aug. 1955, ster. (TEF); *SF 13986*, same locality, 27 July 1955, ster. (P, TEF); *SF 16267*, same locality, forêt cotière, sol latéritique avec concrétions, 11 June 1956, fl. (P).

10. *Schizolaena masoalensis* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, sp. nov.

Ut videtur liana. Folia stipulis ignotis; petiolo 4-5 mm longo; lamina ovata ad elliptica, papyracea, 3.5-7 × 2.5-3.5 cm, apice acuta vel acuminata, margine integra minute incrassata revoluta leviter undulata, basi truncata, nervis secundariis 5- ad 8-jugatis. Inflorescentia pedunculo percontracto insidens ex panicula terminali vel axillari multiflora modice ramosa in surculo laterali portata constans; axibus dense stellato-pubescentibus; bracteis persistentibus late ovatis ad oblatis utrinque dense lanoso-villosis in parva opposita dispositis, ramisculisque axis bractearum pari summo proxime infra involucrem portato id obtegente; involucre sub anthesi leviter 5-lobulato, dense lanoso-villoso, flores duos sessiles circumcludente. Flos sepalis late ovatis, 3.5-4 mm longis, adaxialiter glabris, abaxialiter dense lanoso-villosis; petalis in sicco chartaceis, 5-6 × ca. 3 mm, glabris, apice acutis, marginibus in sicco distaliter involutis; staminibus ca. 30, filamentis 3-3.5 mm longis, glabris; stylo ca. 4 mm longo; stigmatibus glabra. Fructus ignotus.

TYPE.—*Réserves Naturelles 2735*, Madagascar, *Prov. Antsiranana*, (former) Masoala RNI (now largely included in Masoala PN), Canton d'Ambolihitalanana, [15°21'S, 50°20'E], 23 Aug. 1950, fl. (holo-, P!; iso-, MO!, P!, TAN).

Lianas (?). Twigs with scattered to dense stellate indumentum. Leaves ovate to elliptic, grayish-green above, tinged slightly orangish below (in dry material), papyraceous, $3.5-7 \times 2.5-3.5$ cm

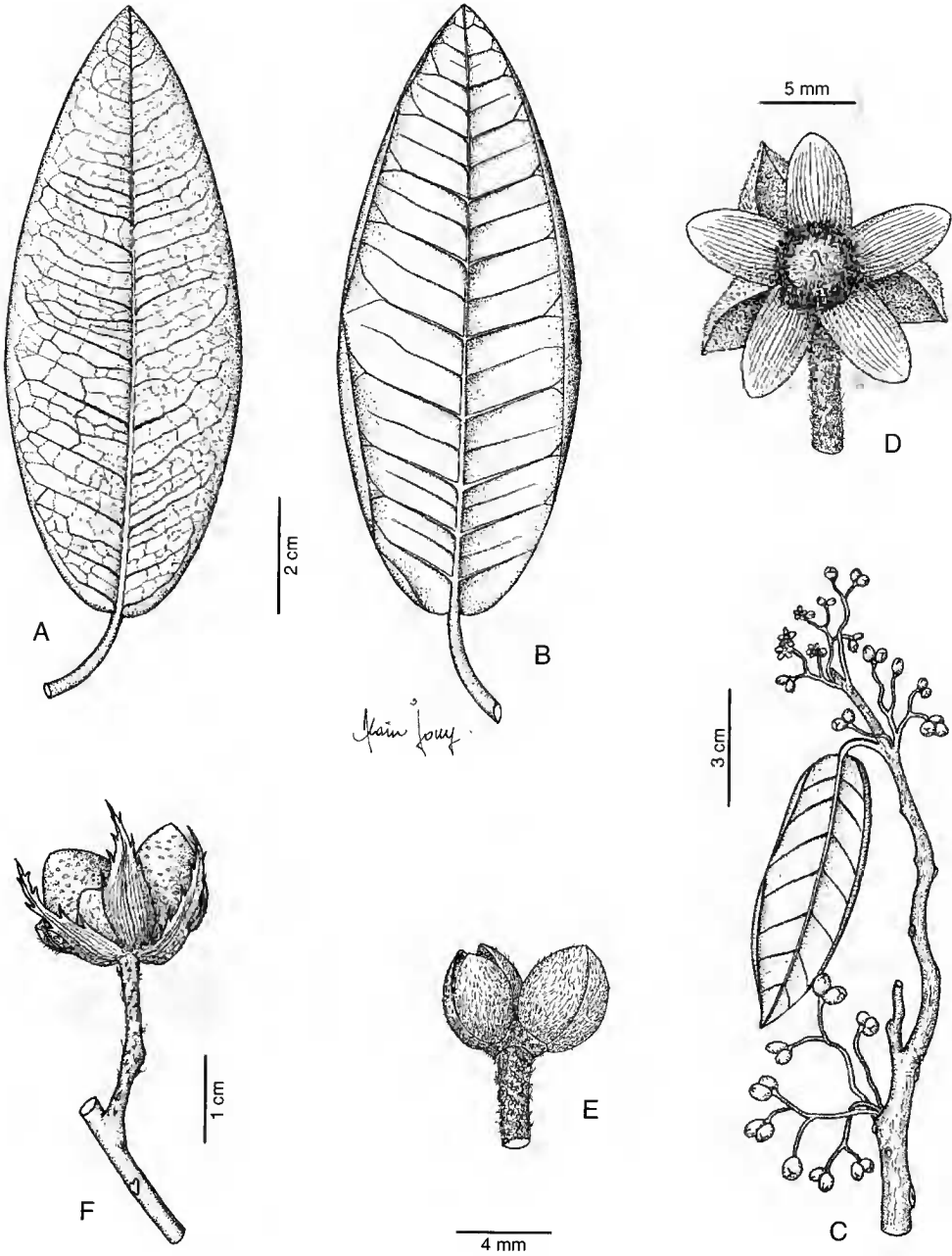


Fig. 6.—*Schizolaena manomboensis*: A, leaf (adaxial surface); B, leaf (abaxial surface); C, branch with inflorescences; D, flower; E, buds; F, fruit with involucre. (A, B, F, Service Forestier 23630; C-E, Service Forestier 16267).

(somewhat smaller in inflorescences), glabrous, apex acute to acuminate, margin entire, minutely thickened and revolute, slightly undulate, base rounded, venation brochidodromous, with 5-8 pairs of mostly subopposite secondary veins joined by rounded arches, midrib weakly channeled above, raised below; petiole 4-5 mm long, sparsely stellate pubescent; stipules unknown, caducous, scars inconspicuous. Inflorescences borne on lateral shoots, terminal and axillary, many-flowered, moderately branched panicles, axes ca. 10-15 mm long, densely stellate pubescent, bracts persistent, in opposite pairs, broadly ovate to oblate, densely woolly villous on both surfaces, the most distal pair on each axis borne immediately below and obscuring the involucre (the peduncle thus highly contracted), involucre in flower shallowly 5-lobed, densely woolly villous, containing 2 sessile flowers; sepals 3, imbricate, broadly ovate, adaxially concave, 3.5-4 mm long at anthesis, glabrous on adaxial surface, densely woolly villous on abaxial surface, apex rounded, margin sometimes hyaline and glabrous; petals 5, obovate, chartaceous when dry, 5-6 × 3 mm, glabrous, apex acute, margins distally involute in dry material; stamens ca. 30, filaments slender, ca. 3-3.5 mm long, glabrous, anthers obloid, 0.5 mm long; ovary depressed-ovoid, densely pilose, 3-locular, style cylindrical, erect, ca. 4 mm long, stigma truncate, glabrous. Fruit unknown.—Fig. 7.

This species is known only from the type collection, which was made within the former Masoala RNI No. 2 (Fig. 2A). While *Schizolaena masoalensis* resembles *S. cauliflora* superficially, it can easily be distinguished by its densely woolly villous calyx and the fact that it is apparently a liana. *Schizolaena masoalensis* has not been relocated since the original collection was made nearly 50 years ago, despite renewed botanical exploration in the area associated with the recent establishment of the Masoala PN. New material, especially in fruit, should urgently be sought. The specimens at P were annotated as "*S. antalaha*" by the third author, but the name was never validly published.

VERNACULAR NAME.—Vandroza.

11. *Schizolaena microphylla* Perrier

Bull. Soc. Bot. France 72: 308 (1925).—Type: *Perrier de la Bâthie* 13127, Madagascar, Prov. Fianarantsoa, bois des pentes occidentales – Tapia, S d'Ambatofinandrahana, sur granite, 1400 m, May 1920 (holo-, P!; iso-, MO!, P!).

A small to rather large tree 2-10(-25) m tall, *Schizolaena microphylla* is restricted to granite and marble outcrops from Ibity to Amboditatra near Ihoay and W to Isalo PN (Fig. 2B). Its elliptic to broadly ovate or suborbicular leaves are the smallest in the genus (along with those of *S. capuronii*), and the species is further distinguished by having stellate pubescence on the abaxial surface of the petals. *Schizolaena microphylla* has been collected recently at Itremo, but was recorded only twice in a protected area (Isalo PN) in 1924,

VERNACULAR NAME.—Fotona.

MATERIAL EXAMINED.—MADAGASCAR: *Decary* 14992, Ambatofinandrahana; *D. Du Puy* M662, Itremo; *Fosberg* 52375, Col des Tapias; *Guillaumet* 4237, Itremo; *Humbert* 14484bis, Faliarivo; *Humbert & Capuron* 28092, Ambatofinandrahana; *Humbert* 28217, 28380, Itremo; *Keraudren* 24588, 24594, Ibity, 25720, Col des Tapias, 25786, Itremo; *Malcomber* 2843, Itremo; *McPherson* 16447, 16460, Itremo; *Morat* 3663, Itremo; *Perrier de la Bâthie* 13127, Ambatofinandrahana, 16589, Isalo PN; *Service Forestier* 11540, Faliarivo, 11572, Ambatomenaloha, 13465, Amboditatra, 13871, Isalo PN, 14757, Ankijana, 18376, Vozontanin'i Tapia, 18567, Isalo PN, 23901, Ambalomahatsara.

12. *Schizolaena milleri* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, sp. nov.

Arbor ca. 15 m alta. *Folia stipulis geminatis liberis chartaceis subpersistentibus anguste ovatis*, 8-11 × 5-6 mm, *apice anguste acutis*; *petiolo* 5-10 mm longo, *glabro*; *lamina ovata ad elliptica, chartacea*, 5-7.5 × 1.5-3.5 cm, *longitudine latitudinem plerumque ut minimum duplo excedente*, *apice acuta ad subacuminata*, *marginem integra minute incrassata revoluta praesertim basin acutum versus*; *nervis secundariis* 8- ad 11-jugatis. *Inflorescentia pedunculo* 9-12 mm longo *papilloso-stellato-strigoso insidens ex panicula terminali parva semel ramificante plerumque 4-flora constans*; *bracteis caducis*; *involucro sub anthesi apice leviter ca. 40-lobulato flores sessiles (unum vel) duos circumcluden-*



Fig. 7.—*Schizolaena masoalensis*: A, flowering branch; B, peduncle with paired flowers. (Réerves Naturelles 2735).

te. Flos sepalis orbicularibus vel late ovatis, 5-10 mm longis, adaxialiter prope marginem minute tomentosis alibi glabris, abaxialiter dense stellato-tomentosis; petalis laete roseis, in sicco papyraceis, 10-14 × 7-8 mm, adaxialiter glabris, abaxialiter prope medium dense albotomentosis et prope marginem glabris, apice rotundatis ad late acutis; staminibus ca. 90 ad 100, filamentis ca. 4 mm longis, glabris; stylo ca. 9 mm longo; stignate minute trilobulato, glabro. Fructus (an immaturus?) globosus diametro ca. 6 mm, dense pilosus, sepalis staminibusque persistentibus atque involucre late infundibuliformi maturitate 13-15 mm alto parce stellato-pubescente in lobulos 5 ca. dimidio ad basim diviso margine denticibus ca. 40 lanceolatis 3-9 mm longis minuto subtentus.

TYPUS.—Miller, Bradford, Rakotonasolo & Randrianasolo 8816, Madagascar, Prov. Toamasina, Mahatsara STF, ca. 5 km N of Foulpointe, littoral forest on white sand, 17°38'18"S, 49°29'04"E, 5 m, 26 Oct. 1996, fr. (holo-, MO!; iso-, K, TAN, P!, WAG).

Tree ca. 15 m tall. Twigs glabrous. Leaves elliptic to ovate, grayish-green above, chocolate-brown tinged red below (in dry material), chartaceous, 5-7.5 × 1.5-3.5 cm, usually at least 2 times as long as wide, glabrous above, sparsely short pilose below, apex acute to slightly acuminate, margin entire, minutely thickened and revolute, especially toward the acute base, venation brochidodromous, with 8-11 pairs of mostly subopposite secondary veins joined by somewhat depressed arches, midrib minutely channeled above, raised below; petiole 5-10 mm long, glabrous; stipules paired, free, chartaceous, somewhat persistent, narrowly ovate, 8-11 × 5-6 mm, glabrous, apex narrowly acute. Inflorescences small, terminal, mostly 4-flowered, once branched panicles, axes ca. 2.5 cm long, papillose stellate-strigose, some trichomes with the central branch longer than the others, bracts caducous, leaving evident scars, peduncles (ultimate axes below involucre) 9-12 mm long, papillose stellate-strigose, involucre in flower with ca. 40 small, bulbous lobes along the rim, containing (1-)2 sessile flowers; sepals 3, imbricate, orbicular to broadly ovate, adaxially concave, 5-10 mm long in bud, expanding only slightly at anthesis, minutely tomentose toward margin and glabrous elsewhere on adaxial surface, densely stellate-tomentose on abaxial surface, apex rounded,

slightly emarginate; petals 5, elliptic to obovate, bright pink, papyraceous when dry, 10-14 × 7-8 mm, glabrous on adaxial surface, densely white tomentose toward the middle on abaxial surface, glabrous along the margins, apex rounded to broadly acute; stamens ca. 90-100, filaments slender, ca. 4 mm long, glabrous, anthers ellipsoid, 0.8 mm long; ovary broadly conical, densely woolly tomentose, 3-locular, style cylindrical, erect, ca. 9 mm long, stigma terminal, minutely 3-lobed, glabrous. Fruit (immature?) globose, ca. 6 mm in diam., densely pilose, stamens and sepals persistent, involucre broadly funnelform, 13-15 mm high at maturity, sparsely stellate pubescent, with 5 shallow lobes reaching ca. 1/2 of the way to the base, margin with ca. 40 lanceolate teeth each 3-9 mm long; seeds unknown.—Fig. 8.

Schizolaena milleri is part of a closely related group of species that also includes *S. laurina* and *S. rosea* (see also the discussion under those species). It is known from only two collections, one from Mahatsara STF near Foulpointe and another nearly 850 km to the S from the Forêt de Bemangidy near Ft. Dauphin (Fig. 4A). *Schizolaena milleri* can be distinguished from its probable relatives by its narrowly oblong-elliptic leaves, large flowers with bright pink petals, and an involucre with a narrowly lacinate margin. Specimens of SF 28662 at P were annotated as "*S. delphinensis*" by the third author, but the name was never validly published.

ETYMOLOGY.—The specific epithet honors our colleague James S. MILLER, who has collected extensively in Madagascar, adding much to our knowledge of the flora, especially of Marojejy PN.

PARATYPES.—MADAGASCAR, *Prov. Tohiara: Service Forestier (Capuron) 28662*, forêt de Bemangidy, entre les fleuves Vatomena et Manambato, au N de Ft. Dauphin, [24°34'S, 47°12'E], 14 Dec. 1968 (MO, P[2 sheets]).

13. *Schizolaena parviflora* (F. Gérard) Perrier

Bull. Soc. Bot. France 72: 307 (1925).—*Rhodolaena parviflora* F. Gérard, Ann. Inst. Bot.-Géol.

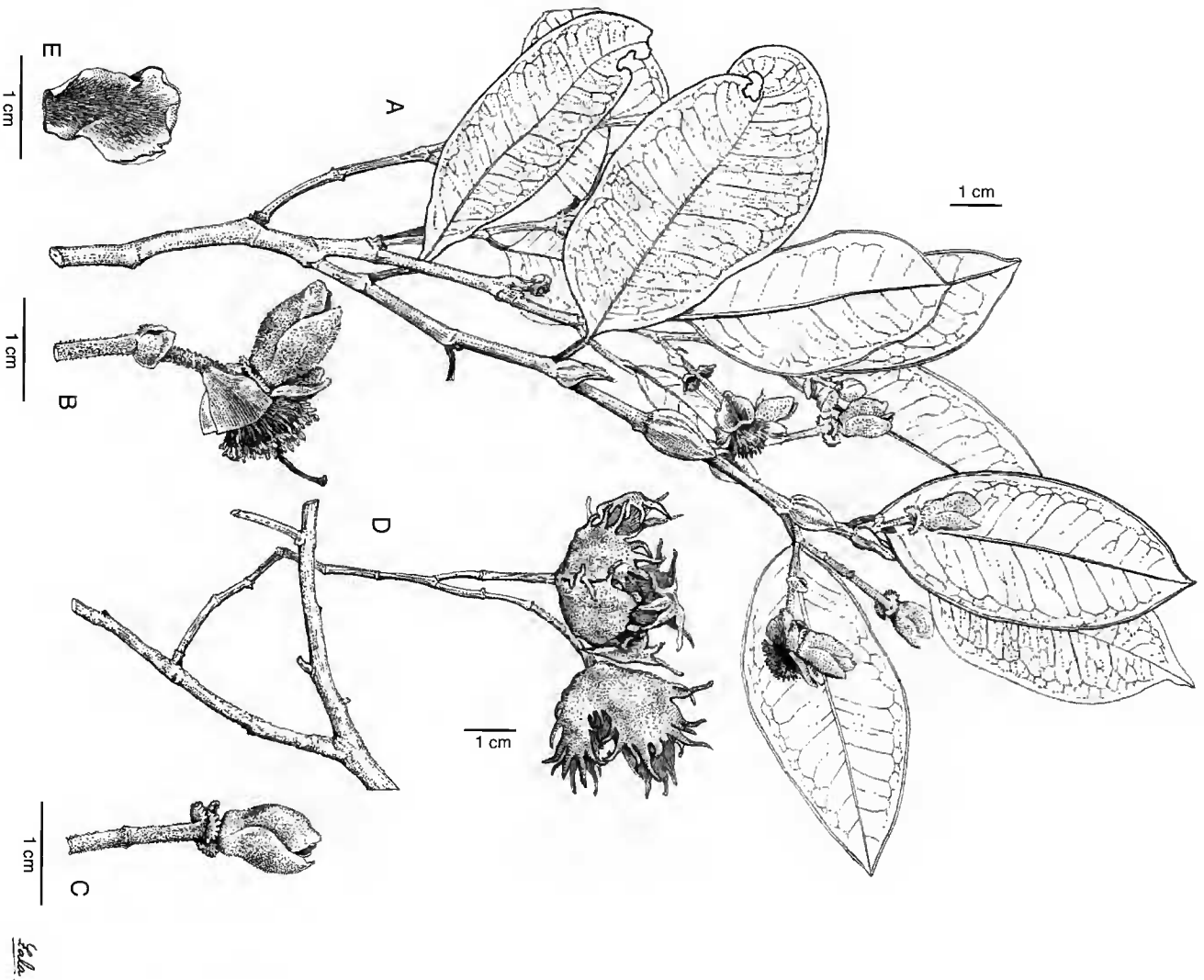


Fig. 8.—*Schizolaena milleri*: A, flowering branch; B, peduncle with paired flowers; C, peduncle with single flower and immature involucre; D, mature involucre. (A, B, D, *Miller et al.* 8816; C, *Service Forester* 298662).

Colon. Marseille, sér. 3, 7: 83 (1919).—Type: *Perrier de la Bâthie 3024*, Madagascar, Prov. Mahajunga, bois sur grès des environs de Maromandia, Mar. 1909 (holo-, P!; iso-, MO!, P!).

Schizolaena parviflora is a large tree 20(-25) m tall, restricted to the Sambirano region between Ambanja and Maromandia (Fig. 2A). It resembles and is probably a close relative of *S. cauliflora*, with which it shares similarly structured inflorescences and small flowers. However, *S. parviflora* can be distinguished by several other features, including its smaller, denser inflorescences borne on leafy shoots (rather than on older branches and the trunk), and its nearly glabrous involucre. A recent collection of *S. parviflora* from Manongarivo RS is the first record of the species since 1963.

VERNACULAR NAMES.—Manizomba, Valintakosy, Vandroza, Voandroza.

MATERIAL EXAMINED.—MADAGASCAR: *Baron 6388*, without precise locality; *Decary 996*, Maromandia; *Derleth 146*, Manongarivo RS; *A. Rakotozafy 279*, Ambanja; *Perrier de la Bâthie 3024*, Maromandia, 5519, Ambaro, 15680, 16245, Sambirano; *Service Forestier 8-R-289*, Ambilobe, 2572, Benavony, 4061, 10410, Maromandia, 10638, Ankitsika, 11469, 13111, Manongarivo RS, 18890, Maropapango, 29270, Antsahamarivo.

14. *Schizolaena pectinata* Capuron

Adansonia, sér. 2, 3: 396 (1963).—Type: *Service Forestier (Capuron) 20336*, Madagascar, Prov. Toamasina, vestiges de forêt près du village d'Ankara (PK 100 et 102 de la route Tananarive-Moramanga), près de la vallée du Mangoro, [18°54'S, 48°09'E], 8 Oct. 1961 (holo-, P!; iso-, MO!, P!).

A medium to large tree 12-25 m tall, *Schizolaena pectinata* has been recorded at low and middle elevation sites, probably on laterite, from Betampona RS and the Perinet-Moramanga region to an area W of Brickaville, and near Ampasinambo W of Nosy Varika (Fig. 4B). Distinguishing features include its narrow, fleshy, lacinate involucre lobes that only partially obscure the fruit, and narrowly elliptic to ovate, chartaceous to subcoriaceous leaves that are 2-3 times as long as wide and have an acute to acu-

minate apex and an undulate margin. *Schizolaena pectinata* was collected at Betampona RS in 1994, the most recent record since 1964. To date no flowering material has been gathered.

VERNACULAR NAMES.—Fotona, Fotondrevaka, Longotra Mavokely, Longotrafotsy, Tanatana-potsy, Tsilongodongotra.

MATERIAL EXAMINED.—MADAGASCAR: *Andrianarisata 256*, Betampona RNI; *Service Forestier 58-R-172*, Périnet-Analamazaotra RS, 179-R-172, Menalamba-Périnet, 10757, Sahamamy, 12166, 12179, 12190, Périnet-Analamazaotra RS, 12230, Bekonkona, 12624, Lorihandava, 14739, Ampasinambo, 16884, Loharindava, 20336, Ankarahara.

15. *Schizolaena rosea* Thouars

Hist. Vég. Isles Austr. Afriq.: 43 (1805).—Lectotype: *Thouars s.n.*, Madagascar, without precise locality (P-JUSS [no. 11971a]!; iso-, P!; designated by CAPURON, Adansonia, sér. 2, 3: 398, 1963).

Known only from five collections, the most recent of which was made in 1956, *Schizolaena rosea* is restricted to Tampolo STF near Fenerive-Est (Fig. 4A). It resembles *S. laurina*, and was placed in synonymy under that species (see discussion above). *Schizolaena rosea* can, however, be distinguished by its smaller, less coriaceous leaves, which are broadest at or above the middle and are usually less than twice as long as wide, and also by its evenly woolly stellate pubescent calyx and stellate involucre.

CAPURON (1963) noted that several collections of *Schizolaena rosea* made by THOUARS are found in the Paris herbarium, as well as material contained in the JUSSIEU herbarium (no. 11971), all of which appear to represent syntypes. The material comprising P-JUSS 11971 also contains a specimen clearly referable to *S. laurina* made by POIVRE, which CAPURON annotated as "11971b" to distinguish it from the THOUARS collection, marked "11971a". CAPURON (1963) indicated that he considered the THOUARS specimen in P-JUSS, which comprises one branch in bud and another in fruit, as the type of *S. rosea*, thereby lectotypifying the name.

VERNACULAR NAMES.—Voandrozana, Vondrozana, Vondrozona.

MATERIAL EXAMINED.—MADAGASCAR: *Service Agricole 1055*, Tampolo STF; *Service Forestier 315-R-107, 15891, 15908, 16036*, Tampolo STF; *Thouars s.n.*, without precise locality.

16. *Schizolaena tampoketsana* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, sp. nov.

Arbor 8-12 m alta. Folia stipulis geminatis liberis hyalinis caducis ovato-lanceolatis, 10-15 × 3-5 mm, apice acutis; petiolo 6-10 mm longo, primo dense stellato-tomentoso deinde glabro; lamina elliptica vel subovata, coriacea, 3-6 × 1.5-3.3 cm, glabra, apice acuta obtusa rotundatave, margine integro revoluta. basi acuta rotundata truncatave; nervis secundariis 7- ad 10-jugatis, adaxialiter conspicue impressis. Inflorescentia pedunculo 1-2 mm longo insidens ex cyma parva axillari 1- ad 3- (ad 4-)flora constans; bracteis caducis; involucre sub anthesi 3- vel 4-lobulato dense stellato-pubescente florem sessilem solitarium circumcludente. Flos sepalis late ovatis ad suborbicularibus, ca. 5 mm longis, adaxialiter glabris, abaxialiter dense lanoso-stellato-pubescente; petalis in sicco chartaceis, ca. 5-6 × 2.8 mm, glabris, apice rotundatis; staminibus ca. 60 ad 80, filamentis ca. 4 mm longis, glabris; stylo ca. 2 mm longo; stigmatibus dilatato, glabro. Fructus ignotus.

TYPE.—*Service Forestier (Capuron) 27404*, Madagascar, Prov. Antananarivo, berges de l'Andranofeno-Sud, sur le Tampoketsa d'Ankazobe, [18°04'S, 47°10'E], 26 Nov. 1967, fl. (holo-, P!; iso-, MO!, P!).

Tree 8-12 m tall, trunk to 40 cm dbh. Young twigs with dense stellate-tomentose indumentum, then glabrous. Leaves elliptic to slightly ovate, light chocolate-brown above, khaki-tan tinged orangish below (in dry material), coriaceous, 3-6 × 1.5-3.3 cm, glabrous, apex acute to obtuse or rounded, margin entire, revolute, base acute to rounded or truncate, venation brochidodromous, with 7-10 pairs of alternate to subopposite secondary veins joined by rounded arches, conspicuously sunken on upper surface, midrib channeled above, conspicuously raised below; petiole 6-10 mm long, densely stellate-tomentose in young leaves, then glabrous; stipules paired, free, hyaline, caducous, ovate-lanceolate, 10-15 × 3-5 mm, with sparse stellate indumentum, apex acute. Inflorescences small, axillary, 1-3(-4)-

flowered cymes, bracts caducous, primary axis 1-4 mm long, peduncles (secondary axes) 1-2(-3), 1-2 mm long, with an evident bract scar at the base, surmounted by a 3-4-lobed densely stellate pubescent involucre containing a single, sessile flower; buds globose; sepals 3, imbricate, broadly ovate to suborbicular, adaxially concave, 3 mm long in bud, expanding to 5 mm at anthesis, glabrous on adaxial surface, densely woolly stellate pubescent on abaxial surface, apex rounded to obtuse; petals 5, obovate, chartaceous when dry, 5-6 × 2.8 mm, glabrous, apex rounded; stamens ca. 60-80, filaments slender, ca. 4 mm long, glabrous, anthers ellipsoid, 0.3 mm long; ovary subglobose, densely pilose, 3-locular, style cylindrical, ca. 2 mm long, stigma terminal, dilated, glabrous. Fruit unknown.—Fig. 9.

Schizolaena tampoketsana is known from only three collections, all made at the type locality on the Tampoketsa d'Ankazobe (Fig. 4B) in 1966 and 1967, one with young leaves just starting to flush, a second in bud, and the third in flower; fruiting material has not been collected. It can be recognized by its coriaceous leaves with an acute apex and sunken venation on the upper surface, and its very short peduncles (i.e., the inflorescence axes immediately below the involucre). The material at P was annotated as "*S. brevipedunculata*" by the third author, but this name was never validly published.

VERNACULAR NAME.—None recorded.

PARATYPES.—MADAGASCAR, *Prov. Mahajanga: SF (Capuron) 24568*, Tampoketsa d'Ankazobe, berges de l'Andranofeno-Sud, [18°04'S, 47°10'E], 1400 m, 27 Feb. 1966, bud (P); *SF (Capuron) 24820bis*, same locality, 25 Sep. 1966, ster. (P, TEF).

17. *Schizolaena turkii* Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf, sp. nov.

Frutex vel arbor usque ad 6 m alta. Folia stipulis geminatis liberis chartaceis caducis ellipticis, 5-6.5 × 1.5-2.8 mm, adaxialiter glabris, abaxialiter dense breviter stellato-hispidis, apice rotundatis ad acutis; petiolo 2-3 mm longo, dense stellato-hispido; lamina anguste elliptico-ovata, chartacea, (3.5-)4.5-6.5 × 1.5-3 cm, longitudine latitudinem plus quam duplo excedente, untrique conspicue stellato-hispida, apice acuminata,



Fig. 9.—*Schizolaena tampoketsana*: A, flowering branch; B, peduncle with single bud; C, flower at anthesis. (Service Forestier 27404).

marginē integrā minute incrassatā, basi truncatā ad cordatā, nervis secundariis 9- ad 12-jugatis. Inflorescentia pedunculo 7-9 mm longo indumento denso stellato-hispido elevato stipitatosve induto insidens ex cyma parva axillari 4- ad 15- (ad 20-) flora parve vel modice ramosa constans; bracteis caducis; involucre sub anthesi 5-lobulato, dense breviter stellato-hispido, apice minute ca. 60-lobulato, florēs sessiles duos circumcludente. Flos sepalis late ellipticis ad subovatis, 2-3 mm longis, adaxialiter glabris, abaxialiter dense stellato-strigoso; petalis roseis, in sicco papyraceis, 3-4 × 2.2-2.8 mm, glabris, apice rotundatis ad late acutis; staminibus ca. 100, filamentis 1.5-2 mm longis, glabris; stylo ca. 2 mm longo; stigmatē truncato, glabro. Fructus (an immaturus?) subglobose diametro ca. 8 mm, dense flavo-stellato-hispidus, involucre expanso 10-12 mm alto in lobulos ovatos 5 duabus tenuis usque ad tres quartas parte ad basin diviso marginē dentibus ca. 100 anguste triangularibus 1-2 mm longis munito subtentus.

TYPUS.—*SF* (Capuron) 23739, Madagascar, Prov. Fianarantsoa, vestige de forêt orientale, très dégradée, près d'Ankovahova à 4 km E de Ranomafana (Ifanadiana), [21°16'S, 47°28'E], 25 Oct. 1964, fl. (holo-, P!; iso-, MO!, P!, TLF!).

Shrubs to small trees to 6 m tall, trunk to 18 cm dbh. Twigs with dense hispid-stellate indumentum. Leaves narrowly elliptic-ovate, pale green (in dry material), chartaceous, (3.5-)4.5-6.5 × 1.5-3 cm, greater than 2 times as long as wide, conspicuously hispid-stellate on both surfaces, especially along the midrib and veins, apex acuminate, margin entire, minutely thickened, base truncate to cordate, venation brochidodromous, with 9-12 pairs of alternate to subopposite secondary veins joined by depressed-rounded arches, midrib weakly raised above, conspicuously raised below; petiole 2-3 mm long, densely hispid-stellate; stipules paired, free, chartaceous, caducous, elliptic, 5-6.5 × 1.5-2.8 mm, glabrous above, densely short hispid-stellate below, apex rounded to acute. Inflorescences small, axillary, 4-15(-20)-flowered, sparsely to moderately branched cymes, axes ca. 5-10 mm long, densely hispid-stellate, bracts unknown, caducous, leaving an evident scar, peduncles (ultimate axes below involucre) 7-9 mm long, with dense, raised to stalked hispid-stellate indumentum, involucre in flower 5-lobed, densely short hispid-stellate, with ca. 60 small lobes along the rim, containing 2 sessile flowers; sepals 3, imbricate, broadly elliptic to slightly ovate, adaxially concave, 2-3 mm long in bud,

expanding only slightly at anthesis, glabrous on adaxial surface, densely stellate-strigose on abaxial surface, apex broadly acute; petals 5, broadly ovate, pink, papyraceous when dry, 3-4 × 2.2-2.8 mm, glabrous, apex rounded to broadly acute; stamens ca. 100, filaments slender, ca. 1.5-2 mm long, glabrous, anthers ellipsoid, 0.2 mm long; ovary subglobose, densely woolly tomentose, 3-locular, style cylindrical, somewhat contorted in dry material, ca. 2 mm long, stigma terminal, truncate, glabrous. Fruit (immature?) subglobose, ca. 8 mm in diam., densely yellow hispid-stellate, involucre expanded, fleshy (?), 10-12 mm high, with 5 ovate lobes divided 2/3-3/4 of the way to the base, margin irregularly dentate with ca. 100 narrowly triangular teeth 1-2 mm long, seeds unknown.—Fig. 10.

A large shrub to small tree 6 m tall, *S. turkii* is known from only three collections, all made near the village of Ranomafana but apparently outside Ranomafana PN (Fig. 4B). It is easily recognized by its pink petals and narrowly ovate leaves that are densely hispid-stellate pubescent on both surfaces, with an acute apex and truncate to cordate base, and raised to stalked hispid-stellate indumentum on the peduncle. The material of *SF* 23739 at P was annotated as "*S. tenuis*" by the third author, but this name was never validly published.

ETYMOLOGY.—The specific epithet honors Daniel TURK, whose extensive collecting at and around Ranomafana PN has contributed greatly to our knowledge of the area's flora.

PARATYPES.—MADAGASCAR, Prov. Fianarantsoa: *Randrianasolo & Bernardin* 193, right bank of Namorona River, less than 1 km upstream from Ranomafana town, 21°15'S, 47°27'E, 600 m, 28 Nov. 1994, fr. (MO, TAN); *Turk, Randrianasolo, Randrianjatovo, Marolaby & Welton* 640, trail S of Morafeno, starting approximately 5 km E of Ranomafana on RN 25, between Morafeno and Sahavanana, 21°20'S, 47°30'E, 600-700 m, 3 Oct. 1994 (TAN).

18. *Schizolaena viscosa* F. Gérard

Ann. Inst. Bot.-Géol. Colon. Marseille, sér. 3, 7: 72 (1919).—Lectotype (here designated): *Perrier de la*

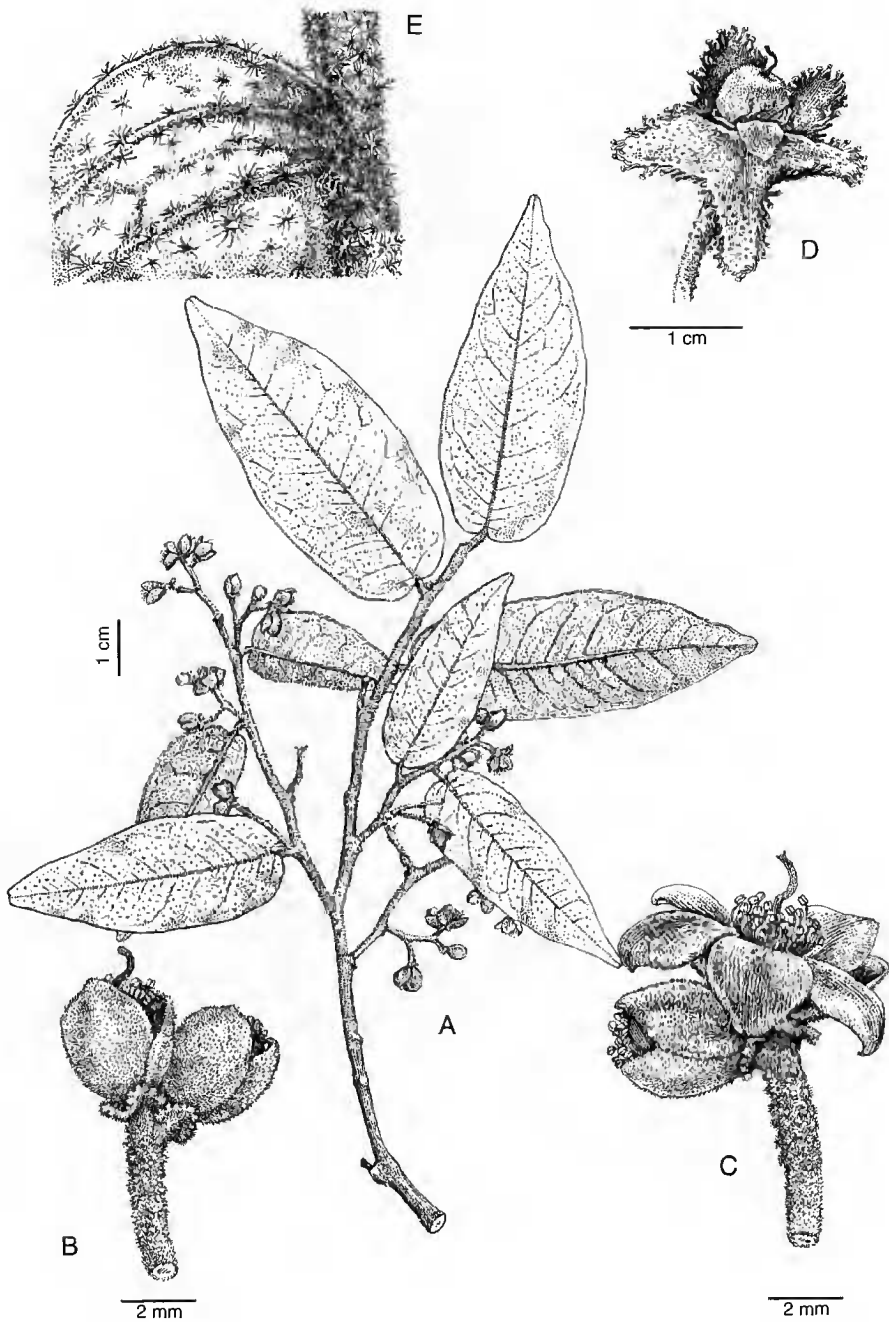


Fig. 10.—*Schizolaena turkii*: A, flowering branch; B, peduncle with paired buds and immature involucre; C, peduncle with flowers at anthesis; D, mature involucre with fruit; E, close up of pubescence on leaf base and petiole. (A-C, E, *Service Forestier 23739*; D, *Randrianasolo & Bernardin 193*).

Bâthie 3019, Madagascar, Prov. Antsiranana, bois très secs sur grès liasiques et permien de l'Ifasy, de la Mahavavy et de la Mananjeba, Oct. 1907 (P!; iso-, MO!, P[2 sheets]!).

Schizolaena viscosa is a tree 8-15 m tall, occurring only in dry forest in the area immediately around Ambilobe, with one collection from near Vohemar (Fig. 2A). It can be recognized by its pubescent petioles and young branches, large, persistent stipules, and large funnelform involucre (characters also found in the closely related *S. cavacoana*), and also by its densely pubescent filaments, a feature occurring nowhere else in the genus. *Schizolaena viscosa* has been collected only once since 1960.

Only one of the specimens representing the type material has an attached fruiting involucre, and it has therefore been chosen as the lectotype.

VERNACULAR NAME.—Malitivoa.

MATERIAL EXAMINED.—MADAGASCAR: *Baron 6364, 6379, 6407*, without precise locality; *Cours 5659*, Ambohipiraka; *Humbert & Cours 32875, 32876*, Ambohipiraka; *Perrier de la Bâthie 3019*, Sambirano, 18753, Ambohipitaka; *Phillipson 2018*, Beramanja; *A. Rakotozafy*, Route de Vohemar; *Service Forestier 3052*, Marsaborilava, 10433, Ambohipiraka, 10511, 11376, Ambilobe, 23418, Ambakirano, 29271, Antsahamarivo; *Service Forestier s.n.*, without precise locality.

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